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QUANTIFICATION OF SOIL PROPERTY AND MAP UNIT VARIABILITY

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled QUANTIFICATION OF SOIL PROPERTY AND MAP UNIT VARIABILITY submitted by ROBERT A MACMILLAN in partial fulfilment of the requirements for the degree of MASTER OF SCIENCE.

ABSTRACT

Procedures currently used to document the characteristics and variability of soil map units lack the precision used to classify and describe the soil individuals themselves. Since the map unit has become the basic interpretive element of soil surveys, it is increasingly essential that it be defined as accurately as possible.

This study involved a quantitative evaluation of fifteen of the most extensive map units found in the Calgary area in order to assess the modal values and relative variabilities of various soil classes and soil properties within these units. A further objective was to evaluate the random transect method as a standard soil survey technique for unbiased sampling of soil units.

For the investigation four to five randomly selected transects were chosen for each of fifteen soil units. Observations of soil characteristics and samples of surface and parent material horizons were taken at fixed intervals along the transects. Qualitative and quantitative analyses of the field and laboratory data were conducted in order to document the compositions of the selected map units and investigate the character and significance of their differences. Confidence intervals were computed for the various parameters and analyses of variance techniques were used to determine if significant unit separations had been made.

Analysis of the data indicated that not all units were equally variable or equally well described and mapped. The overall mapping accuracy was comparable to reported purities for similar soil units mapped at similar scales. Significant differences existed among the defined units with respect to all examined properties and all units were observed to differ from all others with respect to at least one property.

It was concluded that the random transect technique and associated methods of data analysis permitted accurate determination of soil unit characteristics and evaluation of soil unit differences. Information produced by this sampling technique was judged to be highly relevant and a recommendation was made that quantitative evaluations of soil units be adopted as a standard soil survey technique.

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I. INTRODUCTION

Soil mapping may be thought of as consisting of two basic steps. In step 1, the various kinds of individual soils found in a map area are defined and described. Step 2 consists of delineating the geographical distribution of these various recognized soils in such a way that individual outlined areas contain a restricted and describable range of recognized soil types.

Until recently, most research efforts by soil mappers have been related to the problems encountered in step 1. Such efforts have produced considerable refinements in the understanding of the principals governing soil genesis and in the taxonomy used to classify soil individuals.

Lately increased attention has been directed towards the types of problems encountered in step 2. Attempts to describe the geographical distribution of soil individuals currently lack the precision used to describe the individuals themselves. This has led to suggestions that techniques be developed for quantitative assessment of the composition and characteristics of the vehicle used to describe geographically distributed assemblages of soil, namely the map unit.

Since map units have become the basic interpretive element of soil surveys it is increasingly essential that they be defined as accurately and as quantitatively as possible. The success of transmitting information contained on a map and of predicting likely soil behaviour based on

the map is determined by the reliability of the map unit descriptions.

It was recognized that the usefulness of the recently completed soil survey of the Calgary Urban Perimeter would be considerably enhanced by a quantitative evaluation of its accuracy. The Calgary project was chosen for statistical evaluation for several reasons. First, the mapping was done entirely by this investigator who therefore had a first hand familiarity with the concepts used to develop the map units and to recognize the various component soils. Secondly, it was thought that a sufficiently intense level of ground checking had been carried out to be able to anticipate a fairly high level of accuracy. Thirdly, the mapping approach used in the Calgary area embraces most of the new concepts currently being adopted by soil mappers in Alberta. Future mapping projects will likely be comparable in design to the Calgary survey. This will allow application of the quantitative methods tested in this undertaking to future projects. Finally, quantitative evaluations are particularly useful when the basic soil map is destined to be subject to a wide variety of interpretations by a diverse group of users. This condition is particularly true in the Calgary area where potential users include engineers, planners, agriculturalists, assessors, government review agencies and private land owners. All users will benefit from concise descriptions of the various map units. In many cases it is as important to report variability of the features which

characterize a map unit as it is to detail the modal characteristics of that unit.

This investigation involved a quantitative evaluation of fifteen of the most extensive map units found in the Calgary area. The primary objective was to determine the composition of these map units in terms of their component soils and to compare these determinations with the previous estimates of map unit composition which had formed the basis of the working legend. In addition, the observations made and samples analysed in the course of fulfilling this primary objective provided an ideal data base for several secondary evaluations. It was possible to determine modal characteristics and variabilities for many of the properties used to define the Soil Series mapped in the study area. Similar evaluations were made for those properties which were considered significant for the interpretation of the map units for various uses. The data base was also adaptable to statistical techniques whose intent was to determine whether or not the inherent properties of the various map units and Soil Series recognized were sufficiently different to justify the separations which had been made.

A further objective of this study was to evaluate the applicability of the Random Transect Method as described by Hajek (1977) and Arnold (1979) as a standard procedure for statistically valid sampling of map units to determine their composition and soil property variability.

II. LITERATURE REVIEW

A. The Case for Map Unit Quantification

Soil surveyers have recognized the need to quantify map unit composition since the inception of survey efforts (Pendleton 1919) but only isolated attempts have been made to fulfil this objective. Wilding and others (1965) maintained that the increasing number of objectives of soil surveys, in both urban and rural areas, required that greater emphasis be placed on more accurate and quantitative determinations of the mapping unit.

Beckett and Webster (1971) observed that information on variation within map units was scattered and hard to find. They concluded that even an approximate idea of how much variability is commonly accepted within a mapping unit would offer a standard by which to assess the quality of a particular survey. They added that any such quantification would facilitate the use of soil survey information by engineers and others accustomed to working to specified tolerances.

Amos and Whiteside (1975) also noted that most attempts to define mapping unit composition in soil survey reports had been qualitative at best. They concluded that a modernization and quantification of mapping unit definitions in contemporary soil survey reports would result in surveys being more useable for interpretive purposes and of more lasting value. Arnold (1979b) argued that improvement of

mapping skills and improvement of definitions of taxonomic classes could only occur through continuing efforts to quantify map units.

A major conclusion of these and other studies was that estimates of map unit variability were crucial to informed use of soil maps and should be provided as a normal feature of soil survey reports. While increasing attention has been paid to this recommendation, assessment of map unit variability has yet to become a standard soil survey procedure. For example, Nortcliff (1978) was able to identify only one study in which determinations of soil variability were done as part of a general purpose map and soil survey. The following recommendations recently issued by the National Technical Work Planning Conference of the (U.S.) National Cooperative Soil Survey (NCSS) indicate both a recognition of the need to quantify soil map units and an admission that regular use of such techniques is not yet common. The conference recommended that: (NCSS 1979)

1. A subcommittee be established to develop alternative procedures (detailed format and statistical design) to assess:
    a. The taxonomic composition of soil map units
    b. The variability of pertinent soil properties comprising map unit components
    c. The confidence limits relative to the above attributes.
2. Regional committees and cooperatives of the NCSS program

be encouraged to continue development and testing of alternative approaches that permit greater quantification of soil survey information and procedures.

3. A redirection of NCSS emphasis and efforts be adopted towards greater quantification of mapping unit composition as interlinked with soil performance interpretations.

Several studies have responded to this need as identified by the National Technical Work Planning Conference. Arnold (1979a, b) described a random transect technique for evaluating the taxonomic composition of delineations of map units. Steers and Hajek (1979) used a random selection of transects to determine the taxonomic composition of major map units as part of an ongoing soil survey project. Ragg and Henderson (1980) used a nested, random grid, sampling technique to evaluate map unit reliability and variability in Scotland. In Canada, support for quantitative determinations of map unit composition has recently been voiced by C. Wang (1980).

Soil surveys have consistently proven themselves to be useful in delineating landscapes about which predictions of likely behaviour could be made (Miller and others 1979). Some scientists investigating soil variability have considered abandoning subjective prestratification of landscapes in favour of objective statistical differentiation (Davies and Gamm 1970; Webster 1972).

However, most support Arnold's (1979) conclusion that stratification is a powerful tool and should be used to save time and money. Miller and others (1979) remarked that a random data collection technique that allowed every member of the population of soils on the landscape an equal chance of being sampled was neither practical nor necessary in most soil surveys. However,this did not reduce the need to objectively quantify the units defined by stratification procedures.

Some of the strongest arguments for evaluating the variability of prestratified landscape segments derive from the conclusions reached by researchers investigating the potential of statistical techniques to group and delimit non-stratified observations of soil. Most such studies have found good agreement between strata defined by normal survey techniques and those arrived at by statistical analysis of closely spaced grid or transect data. This is not to say that all predefined strata prove acceptable. Nortcliff (1978) warned that beyond certain strata levels (in his case parent material) the delineations made by surveyors appeared to be suitable at best for distinguishing minor soil variability patterns and at worst were artificial distinctions which bore little resemblance to the actual soil distribution.

B. Background and Early Studies

Most early studies of soil variabitity were concerned with deciphering the environmental controls which created individual soils or with assembling soil types into some abstract classification system. However, no less a devotee of classification studies than Marbut cautioned against viewing classification as the ultimate goal. He wrote: (Marbut 1927)

'It should be recognized that a classification of a group of things does not in itself increase our knowledge of those things. It is fundamentally an arrangement to facilitate the use of knowledge. The discovery of the characteristics of the bodies classified and the determination of their relationships significance, and relative importance, constitute the contribution to human knowledge.'

Marbut was apparently referring to the quantification of the properties of abstract groupings of soils. However, the foregoing statement applies equally well to the study of real geographical bodies of soil. Such studies did occur coincident with ongoing classification development. They were conducted mainly by field scientists and they contributed much of the basic information about existing soils which allowed for the development of abstract systems. Marbut (1920) viewed this work as a technical aspect of soil studies and differentiated it from the scientific role of soil classification. These technical studies were more

concerned with defining and describing real bodies of soil than with allocating the bodies to some class of a conceptual framework. The bodies of soil most often studied were individual fields, Soil Series and soil types.

Post (1924) cited several early studies of sampling procedures intended to deal with soil variability. These early studies were done by Thiel (1905), Hopkins and Pettitt (1911) and Bear and Slater (1916). Bear and McClure (1920) indicated that these sampling procedures in turn utilized techniques described earlier by Warington (1895), Wiley (1895) and Whitney (1899). Most of the above papers described how to take a sample and recommended preferred sample depth and numbers of borings to be taken for a given composite sample. Wayruck (1918) recognized the inherent variability of soil properties and the need to apply statistical methods to their determination. Robinson and Lloyd (1915) published an account dealing with the probable error of sampling in soil surveys. They concluded that their field error was considerably greater than their laboratory error with respect to several soil property determinations.

Pendleton (1919) investigated whether the mapping of soil types, as defined at that time, effectively separated different soil areas. His results indicated that soil maps were of limited use, mainly because the classification units were too loosely defined and too often inaccurately mapped. Davis (1936) arrived at similar conclusions after an extensive study of five of the major soil types mapped in

Alabama.

Cline (1945) enumerated the basic principles upon which more recent quantitative evaluations of fundamental soil units were based. He recognized that error due to sampling of soils was generally greater than that due to analysis and that statistics provided a basis for sound soil sampling. He was amoung the first soil researchers to accept that complete randomization was necessary for estimates of significance and to note that for some objectives, knowledge of variability is equally important as knowledge of the mean.

C. Current Approaches to Studies of Soil Variability

The sampling procedures used in recent soil variability studies increasingly adhere to basic statistical principles. In addition, more complex forms of data analysis have been attempted utilizing newly available computer software capabilities. Two distinctly different approaches have developed with respect to establishing the variability of soil landscapes. One method attempts to segregate individual observations into groups and to define and locate group boundaries based entirely on statistical analysis of the data. In the other, predefined stratification units, usually based on landscape characteristics, are accepted as good first approximations of natural groupings and are sampled to test this hypothesis.

Statistical Methods of Defining Soil Groups and Soil Boundaries

Where no prior subjective grouping of soils or landscape units is attempted, areas to be described are sampled using either a regular grid technique (Davies and Gamm 1970; Webster and Burrough 1972) or a series of arbitrarily chosen transects with a constant, short sampling interval (Webster and Cuanalo 1975; Webster 1972). The observations and laboratory results are recorded for each site and statistical techniques are applied which either determine groupings of soils according to their overall similarity, or locate soil boundaries at points of maximum change in properties, or both. Davis and Gamm (1970) used trend surface analysis of grid data to produce an empirical contour map of soil pH values which could be used in discriminating soil areas. Webster and Burrough (1972a, b) used principal component analysis to group observations taken on a regular grid basis. All observations clustered into three distinguishable groups which agreed quite well with previously recognized series. When the statistically determined groups were contoured and compared with a map done by normal survey methods, the agreement was quite good.

Webster (1972) showed how principal component analysis could be used to define the most correct locations of boundaries between different groups at the same time as creating the groups. He located boundaries by determining the sites of maximum rates of change of all soil properties

(expressed as principal components). Again, it was interesting to note that the boundaries chosen mathematically showed good agreement with boundaries drawn by combined air photo interpretation and field inspection. Campbell (1978) used a grid sampling procedure to investigate the forms which boundaries may take. He demonstrated that some properties change values abruptly across a boundary while others vary gradually and do not change any more rapidly across the boundary than elsewhere in the unit.

Webster and Cuanalo (1975) using soil transect correlograms, determined that geologic materials exercised the only recognizable control over soil properties in their study area. Their conclusions regarding the utility of defining groups and locating boundaries in this area through independent statistical treatment of grid sample data are of particular interest to this study. They state that:

> "In practice, soil boundaries can and often are recognized by other more economical means; on aerial photographs or geological maps. The parcels thus delimited may then be used as the sampling units for information about soil. Soil information displayed in this framework would constitute almost the best that could be achieved in this area."

They further note that for most properties, there is little scope for improvement, and any such improvement is likely to require massive sampling effort.

Statistical Methods of Evaluating Predefined Landscape Strata

The second approach to studying soil variability recognizes the contributions which can be made by informed prestratification of the landscape into a series of smaller, supposedly different, sampling units. In this method, a random selection of points, grids, or transects is used to locate sample sites within the predefined strata. The resulting data is used to evaluate the composition and variability of the various strata as well as to test the significance of differences between the sampled groups.

Assumptions Implicit in Techniques of Testing Prestratified Units

The validity of evaluating map unit composition and variability using a random selection of transects rests on two basic assumptions:

1. The first is that there is a relationship between external landscape features and associated soils. This allows surveyors to group similar landscape units which can be expected to contain similar soil assemblages.
2. Secondly, it is necessary to accept that a collection of randomly oriented lines, with certain restrictions (defined as the available population) within every delineation of a given map unit can be taken to be representative of the entire (existent) population of soils within that unit. Further, a subsample of this available population, if selected randomly, and if large

enough, should represent and typify the existent population.

The first assumption is basically a declaration that current techniques of soil mapping provide a reasonable basis for the creation of sampling strata. Miller and others (1979) recognized that the scientific basis of soil mapping is that the locations of soils on the landscape have a degree of predictability. Accepting this as true, surveyors build models of soil-landscape associations which can then be tested through field observations. If field observations confirm the validity of these models, they can be used to construct map units which are then extrapolated to similar landscape features. In this sense, soil mapping may be viewed as a statistical technique in which soil scientists stratify the universe (population of soils) before them in an effort to segregate the landscape into classes that have definable ranges of properties. The basic premise of this operation is that the variance of the map unit is less than the variance in the population of soils in the area as a whole. Arnold (1979b) compared this step to the statistical concept of partitioning of variance. The purpose of sampling the soil, therefore, is not simply to obtain a number of random samples from which conclusions will be drawn to make a map when subjected to statistical techniques, but rather to either confirm or reject the validity of the soil scientist's landscape based prestratifications (Miller and others 1979).

Beckett and Webster (1971) presented a similar assessment of soil survey techniques. They observed that the purpose of soil surveys is to resolve a whole landscape into areas, blocks or parcels that can be managed uniformly. Similar areas are grouped together, and the resulting sets of areas, or mapping units, constitute the map classification. Thus a mapping unit is an area, or group of areas, in which (it is hoped) the soil is less variable than in the larger landscape. They further suggested that in many cases it might be better to map what is mappable and then either to adjust the definition of class limits to fit the map units, or to record the proportions of soils occurring within each mapping unit in any convenient terms. If option two is exercized, a list of defined profile classes serves as a vocabulary to aid such descriptions. There should be no intention to try and map 'pure' occurrences of these narrow profile classes.

The second assumption is that data obtained through a random selection of sample points provides a valid estimate of the true composition and variability of the soil landscape unit being evaluated. In the case of point transects, as used in this study, Johnson (1961) observed that the transect method of area determination depended upon the principle that the total length of a given body along a straight line was directly proportional to the area of that body within the limits of a larger delineation. He noted that transect methods used in soil surveys were equivalent

to Rosiwal transects of thin sections used by petrographers to determine the composition of rocks and that the validity of the technique had been proven mathematically by Chayes (1956). Anderson and Binnie (1961) later substantiated this technique for soil studies. More recent studies (Arnold 1977; Steers and Hajek 1979) have established that point intercept methods of transect sampling provide valid assessments of the proportions of soil along a given transect.

Steers and Hajek (1979) defined soil populations in terms of transects so as to permit random sampling and unbiased site selection in map units to be evaluated. Their technique was designed to utilize most of the desirable bias provided by informed prestratification of the landscape, while at the same time minimizing sampling bias. They took positive steps to assure randomness, so that each individual in their defined populations had an equal chance of occurring in a sample. A random sample so chosen was taken to truly represent the entire population from which it was drawn. The soil populations defined by Steers and Hajek (1979) are as follows:

1. The HYPOTHETICAL POPULATION - that portion of the earth's surface which at one time existed or could have existed in soil pedons. It is not represented in any set of samples because of bias, erosion, or misinterpretation of soil forming processes.
2. The EXISTENT POPULATION - that portion of the earth's

surface which presently exists in soil pedons. This population is real but cannot be sampled in its entirety because of inaccessibility and time limitations. This is the true or target population for soil investigation but it cannot be sampled because all individuals of the soil population may be present but are not equally likely to be encountered in a sampling program.

3. The AVAILABLE POPULATION - that population which is readily accessible for point investigation along a line transect. This population should be investigated and properly sampled to the extent that the sample area represents the existent population.
4. The RANDOM POPULATION - that population actually sampled. It should represent and typify the available population.

The Techniques used to Sample Prestratified Areas

The mechanical process of selecting sample sites within predefined soil landscape strata, in such a way that they typify the strata, can be accomplished in a wide variety of ways, most of which have already been mentioned. The simplest procedure is to locate individual points by generating random numbers corresponding to coordinates of a grid placed over the entire soil map. All points falling within a given soil unit are used to evaluate that unit. Examples of studies using this approach are those of Morse and Thornburn (1961) and Adams and Wilde (1975). Ragg and Henderson (1980) used a two stage sampling procedure in

which small sample grids were located at randomly chosen map coordinates and then one or two sample sites were randomly chosen within that part of the small grid which overlay any of the stratification units which they wished to sample.

A variation of the grid technique involves randomly selecting delineations of map units to be evaluated, often by numbering each delineation and then randomly choosing a few numbers. Arbitrarily or randomly oriented grids are then placed over or within the selected delineation and a number of sample points are selected at random to correspond to coordinates of the grid. Studies which have used this approach include those of Wilding, Jones and Schafer (1965) and McCormack and Wilding (1969). Both these studies emphasized the requirement for maintaining a constant density of observations for all mapping delineations as a prerequisite to meaningful soil variability comparisons between mapping units.

Nortcliff (1978) used a similar grid sampling procedure to locate eight sample areas within each of three parent material strata. He then added another step by sampling four sites within each selected area. The sample points were located along randomly oriented vectors from the initial sample site and were taken at sample intervals of 20 m and 5 m. This nested sampling design allowed him to evaluate the components of variation operative at five levels of stratification, namely; the whole unit, 500 metre squares, 200 metre separations, 25 metre separations, and 5 metre

separations. He demonstrated conclusively that variability was different at different stratification levels and that a large portion of the observed variability occurred in the lowest strata which were below the possible resolution level of soil surveys. These observations confirmed the findings of Wilding and others (1965) that sample density, and consequently sample site separations, must be kept constant in order to allow for valid comparisons of soil variability between different strata .

The third approach involved the use of straight line transects as described by Johnson (1961) and subsequently modified by Arnold (1977) and Steers and Hajek (1979). In this method, soil investigations were conducted along randomly oriented transects at regular intervals chosen according to soil complexity. After a number of transects had been completed, the number of sample sites corresponding to each observed soil were totalled and taken to be proportional to the area of each recognized soil within the studied delineation. White (1965) criticized this method as requiring too many transects per delineation to be acceptable for routine use. However his objective was to accurately determine the proportions of even the most minor inclusions in every delineation. If less rigourous specifications are adopted, fewer transects are needed.

Steers and Hajek (1979) extended the transect technique from a method of evaluating the composition of individual

delineations to one which provided statistically valid estimates of the composition and variability of map units consisting of many individual delineations. They located a minimum of one transect in every delineation of each map unit to be studied. The transects were chosen so as to include as much of the complete range in elevation, drainage, and other observable landscape features as possible for each specific delineation. As such, the transects were judged to typify the existent population of soils for that delineation. Each transect represented an area of about 120 to 240 ha so that large delineations had more than one transect and all transects represented similar sized areas. A sample population was chosen by randomly selecting a few transects from among the entire set of available transects for any given map unit. This random population was taken to represent the existent population and thereby judged to yield data which could be used to describe the variability and composition typical of the map unit under study. The selected transects were sampled by a point intercept method similar to that described by Johnson (1961). Ten to twenty equally spaced observations were made along each transect. One questionable aspect of the technique was the decision to vary the intervals between observations from 30 to 90 m depending on the length of transects. It has been reported that degree of variability and autocorrelation of soil properties are related to sample site separation and area, and that comparisons of data

sampled at significantly different intervals may be invalid (Webster and Cuanalo 1975).

Another advocate of the random transect method of sampling prestratified soil-landscape units is Arnold (1979). He noted that there were many ways to select unbiased sample sites but that the most practical was a randomly selected transect. He preferred transects to random points or grids because of the comparative ease with which points along a transect could be located on the landscape, particularly in forested areas. The location of random points on the landscape was recognized to be difficult, time consuming, and subject to unintentional bias of the type which such sampling schemes were intended to prevent. Furthermore, he contended that the use of line transects, oriented perpendicular to landscape features, assured that more of the points, or small areas, that give rise to variability, had an opportunity to be observed.

Webster and Cuanalo (1975) recognized transects as an often used and economical way of discovering quantitatively the size and frequency of soil change. They recommended that intervals be made equal to simplify location in the field and to standardize data handling and analysis.

D. Techniques used to Evaluate Sample Results

Statistics is one of the most useful tools available for drawing conclusions or making inferences from a given set of experimental data (Thornburne and Liu 1965). Studies

of soil variability have used numerous statistical techniques which varied depending upon the objective of the study and the level of sophistication desired. Most studies had the common goal of wishing to estimate the characteristics of an entire population (its parameters) by determining the characteristics of a sample drawn from that population (its statistics). Several of the most common statistical approaches to studying soil variability are examined below.

Simple Percentage Observations of Class Membership (or Purity)

Several workers have found that documentation of simple measures of accuracy can often be most informative. Consequently they have reported, usually in addition to more detailed statistical analysis, the percentage of all observations taken which met the criteria for membership in the examined class. For example, Wilding, Jones and Schafer (1965) reported that soils were correctly classified with regard to Great Group at 96 percent of 240 observations sites, to Subgroup at 85 percent, to Soil Series at 42 percent and to Soil Type at 39 percent. In addition, parent material was judged to be mapped accurately 88 percent of the time, erosion 94 percent, pH 70 percent, solum thickness - 63 percent and drainage class 65 percent. Table 1 summarizes a number of other studies in which similar assessments were made. One significant finding of all these studies was that no mapping units contained less than 15

Table 1 Estimated 'Purity' of Typical Soil Mapping Units (after Beckett and Webster, 1971 with recent additions)

Source	Great Group	Subgroup	Series	Type	Phase
1)Andrew,Stearns(1963) 20 observations in each of 24 4 ha blocks				58	
2)Powell,Springer(1965) 32 observations on average in each of 16 random 65 ha blocks			74	64	59
3)Wilding,Jones,Schafer (1965) 10 observations in each of 24 4 ha blocks	96	85	42	39	
4)McCormack,Wilding(1969) 10 observations in each of 20 2 ha blocks			37	46-78	
5)Amos,Whiteside(1975) 50 observations in each of 12 mapping units					0-78
6)Adams,Wilde(1975) 31 sites from 1 mapping unit			80		
7)Burrough(1969) 120 observations in each of 3 1.3 sq. km. blocks			63 51 45		
8)Bascomb,Jarvis(1976) 90 observations in 3 delinations of 1 map unit			60		
9)Ragg,Henderson(1980) 644 observations in 4 map units randomly located over whole map			54		
10)Beckett,Webster(1971) rounded median figures from above	70	55	50	60	60

percent inclusions. In the absence of defined guidelines, Beckett and Webster (1971) proposed that their median values of 50 to 60 percent be utilized as a standard when comparing taxonomic purity of mapping units at the series level.

Coefficient of Variability Approach

Wilding and Drees (1978) advocated using the coefficient of variability as a measure to compare soil property variation among different sampling entities. The coefficient of variability (CV) is a statistical measure of sample variation and is defined as sample standard deviation (S) expressed as a percentage of sample mean ($\bar{x}$) according to the formula

$$CV=100*S/\bar{x} \qquad (1.)$$

It is appropriate for comparing dispersion of different soil properties free from scale factor, but it assumes normal frequency distribution, no co-variance between the sample mean and the standard deviation and data where the mean does not approach 0. Several authors, including Wilding and Drees (1978) have used coefficients of variation to demonstrate how morphological, physical and chemical properties became increasingly variable at higher levels of stratification .

Beckett and Webster (1971) made extensive use of the coefficient of variability to allow them to compare results of numerous studies with diverse sampling methods and objectives. They observed increases in CV with increase in

size of area sampled as confirmed by Wilding and Drees (1978). They also computed coefficients of variation for numerous properties for both profile classes and mapping units for data obtained from an extensive review of the literature. Finally, they investigated whether properties could be grouped according to their expected variability within any given sampling unit and proposed three groups of increasingly greater variability. Drees and Wilding (1978) also proposed three groupings of properties of increasing variability but unfortunately the two groupings do not completely agree. A comparison of the two sets of recommendations appears in Table 2.

The studies of Beckett and Webster (1971) and Drees and Wilding (1978) provided procedural guidelines for future investigations and baseline data against which to compare future results. For example, Bascomb and Jarvis (1976) reported the CV's of several of the properties determined in their study and compared them to the reference values suggested by Beckett and Webster (1971). This comparison is summarized in Table 3.

Descriptive Statistics

One of the most common approaches to assessing soil variability involves determination of the means, confidence intervals, limits of accuracy, and required sample size for individual properties or observations made within designated strata. Elements of this approach have been used by Harridine (1949), Aljibary and Evans (1961), Morse and

Table 2. Comparison of suggested Soil Property Variability Classes from Two Different Sources

Group	Beckett and Webster (1971) Properties	Median C.V.*	Wilding and Drees (1978) Properties	C.V. Range
I (least variable)	Sand, Silt, Clay, Plastic Limit, Liquid Limit Horizon Thickness Total P	23 (23)	Soil color, pH A horizon thickness	<15%
II (moderately variable)	Organic Matter, CEC, Nitrogen	35 (38)	Sand, Silt, Clay, C.E.C., B.S., Soil Structure, Liquid Limit, Calcium Carbonate Equiv.	15-35
III (most variable)	Available P, Mg, Ca, K.	58 (84)	B2/Solum Thickness Chroma, Mottle Depth Lime Depth, Cations Fine clay, Organic Matter, Plastic Index	>35

* Bracketted values refer to subsoils; non bracketted to topsoil

Table 3. Variability of Properties within Series Map Units (expressed as C.V.) (after Bascomb and Jarvis 1976)

	Beckett, Webster (1971)		Crosson, Protz (1974)		Denchworth Map Unit.
	Calculated Means	Suggested Values	Brantford Series	Beverly Series	
Silt topsoil	5	23	63	36	16
Silt subsoil	4	23			19
Clay topsoil	27	23	51	54	12
Clay subsoil	26	23			18
O.M. topsoil	33	35	34	20	15
O.M. subsoil	48	38	4	3	13
pH topsoil	14				9
pH subsoil	12				10
Phos topsoil	130	58			52
Phos subsoil	106	84			166
Lime Depth	35		62	42	21
Topsoil Thickness	21	23	53	37	18

Thornburn (1961), Andrew and Stearns (1963), Liu and Thornburn (1965), Walker, Hall and Protz (1968), and Adams and Wilde (1976a). Such determinations were frequently complemented by some form of analysis of variance to determine the significance of property mean differences between groups. Analysis of variance techniques are covered later in this discussion.

For calculation of means and confidence intervals to be valid, the set of observations being evaluated should have an approximately normal distribution. Liu and Thornburn (1965) noted that even though the population being tested may not be normally distributed, the sampling distribution of the means of samples will be approximately normal if the sample size is sufficiently large and the population has a finite variance. They concluded that it was safe to assume a normal distribution for most experimental soils work. Rao and others (1979) reported that normal and lognormal distributions appeared to be the most frequently observed statistical distributions for describing the spatial variability of soil properties. They concluded that both normal and lognormal distributions may adequately describe sets of soil measurements with coefficients of variation less than 40%.

1. *Measures of Central Tendency and Dispersion*

Determination of Confidence Intervals requires information about the central tendency of observations (the mean) and the dispersion of observations about the

mean (the variance). The mean ($\bar{x}$) is calculated according to the formula

$$x = \sum_{i=1}^{n} \bar{x}i/n \qquad (2.)$$

Variance (S^2) is the sum of the squares of deviations of the individual observations from the mean divided by one less than the total number of observations according to:

$$S^2 = \sum_{i=1}^{n} (xi-\bar{x})^2/n-1 \qquad (3.)$$

Standard Deviation (S) is the most commonly reported measurement of dispersion of observations about the mean. It is the positive square root of the variance:

$$S=\sqrt{S^2} \qquad (4.)$$

Liu and Thornburn (1965) reported that it was possible to show that the mean of the sampling distribution of the means will tend to be the population mean (μ) and the variance of this sampling distribution (Sx^2) will tend to approach the population variance (S^2), divided by the sample size n. Thus, Standard Error (Sx) is defined as the standard deviation of the mean and is related to the population standard deviation (σ) by the ratio of the positive square root of sample size n according to

$Sx = \sigma/\sqrt{n}$ or $Sx = S/\sqrt{n}$ (5.)

when S is used as an estimate of(σ).

2. *Confidence Intervals and Limit of Accuracy* Since the sampling distribution of the means has a mean of u and a standard deviation of $\sigma/\sqrt{n}$, and is normal in shape; it is possible to determine the probability that a sample mean ($\bar{x}$) might be found within a specified distance of the population mean (μ) based on the characteristics of known distributions. In most situations, both (μ) and (σ) are unknown and only the sample statistics $\bar{x}$ and S are known. Using $\bar{x}$ and S as estimates of the population mean and standard deviation, it is possible to set up a confidence interval around $\bar{x}$ such that, at a specified probability,(μ) the true population mean, would be found somewhere in this interval. The confidence interval inequality is:

$$\{\bar{x} - tSx\} < (\mu) < \{\bar{x} + tSx\} \quad (6.)$$

Where t is a value obtained from an empirically determined distribution called the t-distribution. The t-distribution is similar to a normal distribution except that it is flatter and more spread out. It approaches normality closely if it is based on a large sample size. The values of $\bar{x}$ + (tSx) and $\bar{x}$-(tSx) are referred to statistically as the confidence limits and tSx as the limit of accuracy (L)

3. *Required Sample Size*

Based on the definition of the limit of accuracy, it is possible to determine the sample size required to predict the population mean within a definite range for a certain level of accuracy.

Since the limit of accuracy $L=tS/\sqrt{n}$

Then $n=(tS/L)^2$ (7.)

Where t is the value for infinite degrees of freedom but varies according to probability level; S is the standard deviation; and L is chosen to be some arbitrary value for allowable error.

Arnold reported (1979a) that predictions of required sample size had been used as measures of variability of a soil population with respect to a sampled property and as criteria to compare the relative efficiency of sampling methods.

Binomial Confidence Limits Approach

A special case of the confidence interval technique described above has been proposed for use in transect evaluations of soil survey map units (Arnold 1979; Stears and Hajek 1979). Arnold (1977) noted that in soil survey, many observations are of a binomial nature. That is, an observation either belongs to a class of interest or it belongs to some other. He assumed that soil scientists were able to recognize differences among soil properties and

thereby indicate whether an observation belonged to one class of soil or another. For the analysis he asked only if each observation was soil A or not soil A. He then evaluated the average amount of soil A in any given strata and determined the dispersion of the estimates of soil A within that strata. Two distinctly different techniques were proposed for determining the confidence limits for soil A. One was a somewhat modified application of the equations detailed above (Arnold 1977) and the other utilized a simple graphical solution that required knowledge only of the number of observations which met the defined class requirement and the number of 'other than' observations (Arnold 1979a).

Arnold's (1979a) proposed graphical method of determining binomial confidence intervals involved a modification of fiducial limits graphs published by Clopper and Pearson (1934). He plotted the total number of observations against the number of observations having class membership other than the one of interest. The resultant intersection was interpolated to obtain the upper and lower confidence limits (Figure 1).

Analysis of Variance

Analysis of variance essentially comprises a breakdown of the total variation of a variable or group of variables into parts which can be assigned to the separate contributing sources (Nortcliff 1978). It is based on the principle that the total sums of squares can be divided into

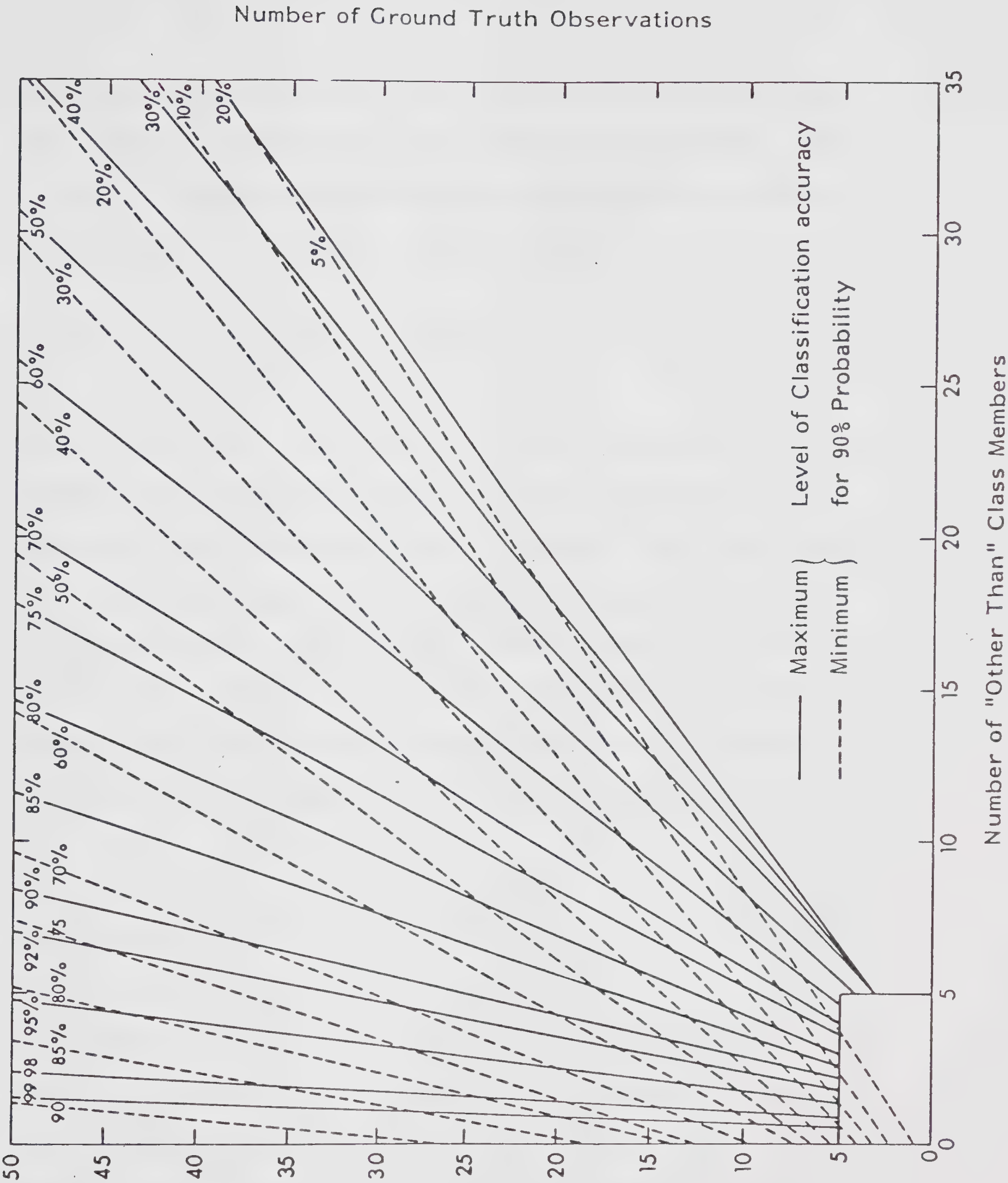

Figure 1. Graph Used for Solution of Binomial Confidence Intervals (after Arnold, 1979a)

two parts, one associated with the sample means and the other associated with the within-sample individuals. In any division it is possible to obtain mean squares estimated by dividing the sum of squares by the degree of freedom. Thus:

$$S(1)=SS(1)/df(1) \text{ and } S(2)= SS(2)/df(2) \quad (8.)$$

Where S(1) is the within-group variance and S(2) is the between group variance. SS(1) and SS(2) are the sums of squares of the respective groups and df(1) and df(2) are their respective degrees of freedom. The between group/within group ratio of the mean squares is known as the F ratio. It is based on the F-distribution which differs according to the number of degrees of freedom in both the numerator and the denominator. It is calculated according to:

$$F=S(2)/S(1) \quad (9.)$$

The F value representing this ratio is then compared to the critical F value for the 2 degrees of freedom used and the level of significance desired. If the calculated F value exceeds the critical F value the sample means were not estimates of the same population and therefore significant differences are shown to exist amoung the various tested means.

Beckett and Webster (1971) reviewed several studies where the authors had partitioned the variance and tested the between group/within group ratio of the mean squares (the F-ratio) for significance. Wilding and others (1965) tested the significance of differences within mapping units and within delineations of mapping units of seventeen soil properties. Fifteen of the properties were found to be significantly less variable within delineations than between delineations. Seven properties were less varible within mapping units than between units. In contrast, McCormack and Wilding (1969) found that for all properties tested, the variability within mapping delineations was equal to or greater than that between delineations of the same unit. Liu and Thornburn (1965) demonstrated significant differences between soil types for various physical properties.

Nortcliff (1978) used analysis of variance of the first few principal components generated by principal component analysis of his data as a substitute for analysis of all the variables individually. He partitioned the variance into levels corresponding to sampling strata which were a function of sampling intervals within parent materials. He demonstrated that a considerable portion of the variability occurred at the lowest levels (shortest sampling intervals) and that the degree of variability at any one level differed among the various parent material strata.

Edmunds (NCSS 1979) recommended replication of observations if analysis of variance techniques were to be

used. He advocated use of a nested sampling technique and analysis of variance (ANOVA) to determine whether pedons or delineations were similar or different at a given probability level. He partitioned the total variance into error (variability within 7 metres), pedons within delineations, delineations within strata and strata within soil associations to locate the source of variability in a mapping unit. Two separate mapping units were justified only if the major portion of the variance was among strata.

In summary, analysis of variance techniques can be used to test the significance of the difference between sample means for any number of populations or strata. They can also be used to locate the sources of variability within a population in order to analyze and appreciate that variability. Beckett and Webster (1971) argued that significance tests needed to be interpreted with caution and suggested that analysis of variance should be regarded primarily as an efficient means of deriving the components of variability. Liu and Thornburn (1965) noted that "when the F-statistic is used to indicate significant differences among the K population means, it fails to reveal which of the sample means differ from one another." Further analysis such as least significant difference (LSD) multiple comparison procedures were necessary in order to determine which of a group of sample means were significantly different.

III. MATERIALS AND METHODS

A. The Study Area

Location and Extent

The fifteen map units evaluated by this study were all defined for the recently completed soil survey of the Calgary Urban Perimeter (MacMillan in preparation). This arbitrarily defined area consists of about 236,000 hectares surrounding the city of Calgary. The precise boundaries of the study area are shown in Figure 2. Also shown are the approximate locations of the 74 transects along which the information for this study was obtained.

Physical Environment

The study area includes diverse soil and landscape conditions. Knowledge of the distribution of parent materials within the Calgary area was of particular importance in formulating the concepts used to define the soil units. Three major source areas were recognized for tills found in the Calgary area. The western portion of the area is covered by till which has a Rocky Mountain origin and advanced eastward out of the mountains. The eastern portion is covered by till deposited by a Laurentide glacier which advanced westward from centers near Hudson Bay. The central part of the area contains a mixed till which has properties characteristic of both cordilleran and continental tills. It is thought to have been deposited by glaciers which advanced out of major foothills valleys north

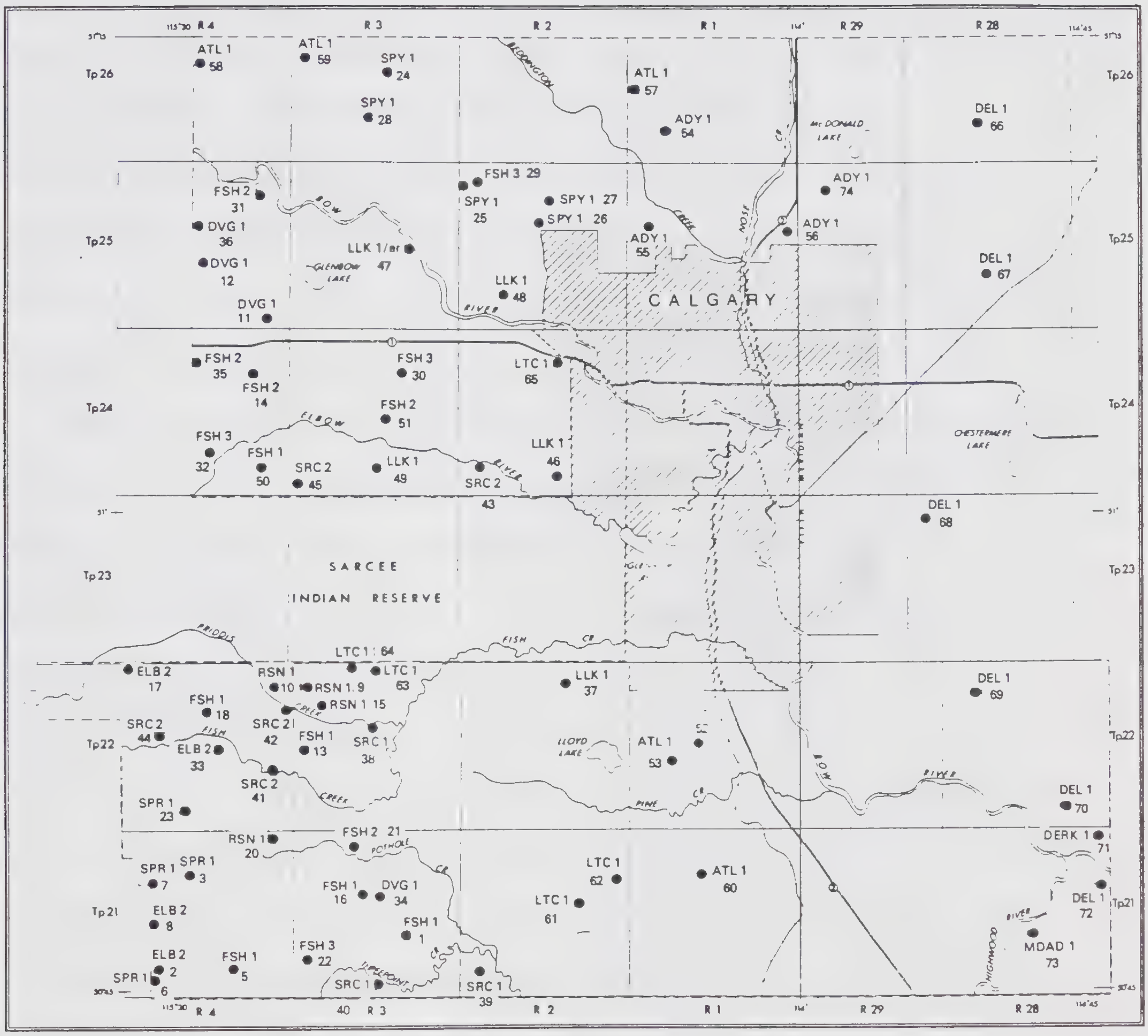

Figure 2. Location of Transect Sites within the Study Area.

of Calgary and were deflected southeast upon encountering the margins of the Laurentide glacier(Proudfoot and others 1981). Most of the glaciolacustrine sediments mapped in the area are fine to moderately fine textured and were deposited in proglacial and supraglacial lakes. Many of the glaciolacustrine lakes resulted from ponding between the retreating glacier front on the east and the regional slope on the west. Glaciofluvial materials occur mainly within or adjacent to the Bow and Elbow valleys and at locations of one time glacial margins. They consist primarily of gravels or sands but include some moderately fine textured silty materials. Silty eolian deposits are recognizable, but thin and discontinuous throughout the study area. They are of mappable extent only in a region which parallels the Bow Valley and the western limit of Laurentide glaciation. Alluvial, colluvial and organic materials are of only minor extent. Two alluvial units were evaluated in order to assess the expected variability of this material. No organic or colluvial units were sampled although a few sites were in organic or colluvial materials.

B. The Mapping

Field Procedures

Mapping of the study area was conducted according to procedures currently used by the Alberta Soil Survey. Beginning in 1977, preliminary field and office investigations were carried out to determine the nature of

various soils likely to be encountered within the area and their relationships to observable landscape features. Landscape units were then outlined on 1974 panchromatic aerial photographs taken at a scale of approximately 1:31,680. From June 1977 to August 1980, traverses were made at one to two mile intervals, or less, along roads and road allowances, and approximately six to ten soil observations were taken within or bordering every section of land. This corresponded to a level 3 Survey Intensity Level as defined in 'A Proposed Soil Mapping System for Canada' (Expert Committee on Soil Survey 1979). At this level, most traverses are by vehicle and some are on foot. Some boundaries and almost all delineations are checked in the field.

The soil encountered at each inspection site was classified and given a Soil Series name if applicable. Profile descriptions and site characteristics such as parent material, type and texture, drainage, slope, landform, vegetation, erosion and stoniness were recorded at each location. The recorded observations were used to test the validity of the landscape units previously outlined on photos. Where necessary, adjustments were made to the physical location of unit boundaries on the photos or to the conceptual notion of the composition and characteristics of the defined landscape units. At the end of each field season, the separations which had been verified in the field were compiled, checked, and transferred to 1:50,000 National

Topographic Series (NTS) base maps in preparation for final drafting and publication.

Map Unit Conceptualization and Definition

The mapping units defined for this survey represented a subdivision of the whole area into less variable units in keeping with the concept of informed prestratification of the landscape. Such prestratification is based on an interpretation of the factors affecting the genesis and distribution of soils on the landscape. Consequently, the map area was stratified into successively limited segments in the following hierarchical order.

1. *Ecological Subdivisions*

   The highest level of stratification was based on assessments of such soil forming factors as climate and vegetation as they related to physiography. Physiographic subdivisions were recognized which were judged to have similar climatic and vegetative regimes throughout their extent. Climate zones were defined according to Agroclimatic Zones of Alberta (Bowser 1967) and vegetative zones according to Rowe (1959).

2. *Soil Groups*

   Within a given climatic-physiographic zone, soil groups were established which consisted of closely interrelated Soil Series developed on similar parent materials under similar climates. All landscape units dominated by a single Soil Series were placed into a soil group named after that series. Soil groups were considered to be

stratifications of physiographic subdivisons based upon differences in parent material and dominant soil forming processes. Soil groups were defined strictly as a mapping convenience used to bring together various collections of soils in order to focus on pertinent aspects of the landscape.

3. *Soil Units*

The broad soil groups were further subdivided into soil units which were defined as subdivisions of soil groups such that within a given soil unit, the component soils were found in specified proportions. The soil unit, in combination with phase modifiers, was adopted as the basic element used to describe and interpret soil-landscape segments. Similar soil-landscape segments were outlined and placed within a named soil unit. The sum of all individual soil-landscape delineations placed into a given soil unit formed the basis for the description generated for that unit. Consequently, soil units were not viewed as real bodies of soil. They were generalized descriptions of what might be expected to be found within any given soil landscape delineation assigned to that unit.

4. *Soil Series*

The individual soils within any given soil unit were classified according to Soil Series. This is the basic unit of soil classification in the Canadian System of Soil Classification (Canada Soil Survey Committee (CSSC)

1978a) and consists of soils that are essentially alike in all major profile characteristics except texture of the surface. In this survey, Soil Series were defined for all different soils of significant areal extent. The series names were used as a vocabulary to describe the assemblages of different soils found in designated soil units. No attempt was made to map pure areas consisting of individual expressions of Soil Series. Series were viewed as the building blocks or constituents of map units and not as mappable soil bodies.

Use and Significance of the Closed Legend Concept

The technique used to identify landscape units on the map and describe them in the report employed concepts of the closed legend approach to mapping. Descriptions were provided for each unique soil unit notation found on the maps (excluding phase differences). In this method, similar landscape segments are grouped and described according to a range of characteristics common to all or most members of that group. The concept employed is to describe repeating patterns of landforms in terms of their included soils and landscape attributes. This approach allows the surveyor to fully describe features pertaining to the actual outlined areas rather than detailing only the nature of individual components as is the case with 'open' legends. The closed legend approach therefore lends itself to random transect evaluation of its descriptive accuracy as all occurrences of a soil unit defined by a particular legend symbol are

expected to possess soil assemblages and landscape features characteristic of that soil unit. Thus, a soil unit defines a population of soils from which a random sample may be extracted for the purpose of characterizing that population.

C. The Tested Map Units

Criteria for Selection of Map Units to be Evaluated

Several considerations were involved in selecting the soil units to be included in this study. The first objective was to evaluate those units which were of greatest areal extent within the study area. This would allow for quantification of the largest proportion of the map area through determinations of the composition of the smallest number of soil units. In addition, care was taken to select at least one soil unit from among each of the major recognized parent geologic materials. A third consideration was the desire to evaluate a few soil units belonging to the same soil group in order to determine if valid separations had been made within soil groups.

To achieve these objectives, all the soil units defined as of April 1980 were ranked according to how well they met the above criteria. Attempts were made to conduct transect evaluations of at least five delineations of as many of these ranked soil units as time permitted. The fifteen soil units described below are those that could be tested in the time available.

Original Descriptions of the Tested Map Units

The original descriptions of the soil units evaluated by this study were very general in nature (Table 4). The proportions of major included soils (Table 5) were determined by subjective field estimates which utilized concepts of dominant and subdominant profile types within given landscape units. No rigourous, quantitative methods were employed to arrive at these estimates; consequently exact agreement with the determined soil proportions was not expected. More extensive and accurate descriptions of the Soil Series and the soil units will appear in Soil Survey of the Calgary Urban Perimeter (MacMillan, in preparation). Differences in the two sets of descriptions reflect the adjustments made to map unit descriptions in the final report as a result of this study.

D. Map Unit Sampling

Sampling of the map units was conducted using slight modifications of the procedures outlined by Steers and Hajek (1979) and Arnold (1977 1979). The objective of the sampling was to obtain a random sample from each investigated map unit such that the sample represented and typified the unit. The following procedure ensured that within a given soil unit, the samples were both randomly selected and representative.

TABLE 4. ORIGINAL DESCRIPTIONS OF THE EVALUATED SOIL UNITS

UNIT	ZONE	PARENT MATERIAL / LANDFORM	SOIL COMPOSITION AND COMMENTS
ADY 1	1	FINE LOAMY TILL. UNDULATING TO GENTLY ROLLING	WELL DRAINED BLACK CHERNOZEMICS. TILL HAS WASHED APPEARANCE.
ATL1	2H	FINE LOAMY TILL.UNDULATING TO GENTLY ROLLING	WELL DRAINED BLACK CHERNOZEMICS. UNIT MAPPED ON SMOOTH UNIFORM TOPOGRAPHY.
DEL1	1	FINE LOAMY TILL. LEVEL TO GENTLY ROLLING	WELL DRAINED BLACK CHERNOZEMICS. ISOLATED PATCHES OF SURFACE SALTS MAY OCCUR.
DVG1	3H	FINE LOAMY TILL. UNDULATING TO GENTLY ROLLING	WELL DRAINED BLACK CHERNOZEMICS. TILL IS FINE CLAYEY IN PLACES.
ELB2	5H	VARIABLE THICKNESS FINE CLAYEY GLACIOLACUSTRINE .	MODERATELY WELL DRAINED ORTHIC GRAY AND DARK GRAY LUVISOLS.
FSH1	3H	VERY FINE CLAYEY GLACIOLACUSTRINE. UNDULATING TO GENTLY ROLLING	MODERATELY WELL DRAINED BLACK CHERNOZEMICS. SLOWLY PERMEABLE SOILS.
FSH2	3H	VERY FINE CLAYEY GLACIOLACUSTRINE. UNDULATING TO HUMMOCKY.	MODERATELY WELL DRAINED BLACK CHERNOZEMICS WITH POORLY DRAINED HUMIC GLEYSOLS IN SCATTERED WET DEPRESSIONS. SLOWLY PERMEABLE SOILS:
FSH3	3H	VERY FINE CLAYEY GLACIOLACUSTRINE BLANKET TO VENEER OVERLYING TILL. UNDULATING TO HUMMOCKY	MODERATELY WELL DRAINED BLACK CHERNOZEMICS. TILL SUBSOIL IS OFTEN FINE CLAYEY. SLOWLY PERMEABLE SOILS.

TABLE 4. ORIGINAL DESCRIPTIONS OF THE EVALUATED SOIL UNITS

UNIT	ZONE	PARENT MATERIAL / LANDFORM	SOIL COMPOSITION AND COMMENTS
LTC1	3H	FINE LOAMY TILL BLANKET TO VENEER DRAPED OVER BEDROCK. INCLINED, RIDGED AND STEEP.	WELL DRAINED ORTHIC GRAY AND DARK GRAY LUVISOLS WITH OCCASIONAL EUTRIC BRUNISOLS. UNIT ALSO CONTAINS LITHIC SOILS AND SLOPE WASH.
LLK1	1	FINE SILTY TO FINE CLAYEY GLACIOLACUSTRINE. NEARLY LEVEL TO GENTLY UNDULATING.	WELL DRAINED BLACK CHERNOZEMICS. VERY SILTY SUBSOIL.
RSN2	5H	FINE CLAYEY TILL. UNDULATING TO GENTLY ROLLING	MODERATELY WELL DRAINED ORTHIC GRAY AND DARK GRAY LUVISOLS.
SPR1	5H	FINE LOAMY TO LOAMY SKELETAL TILL BLANKET TO VENEER OVERLYING ROCK. RIDGED, INCLINED OR STEEP.	WELL DRAINED GRAY LUVISOLS OR EUTRIC BRUNISOLS. LITHIC SOILS AND SLOPE WASH ARE COMMON.
SPY1	3H	FINE LOAMY TO LOAMY SKELETAL TILL, HUMMOCKY.	THIN STONY WELL DRAINED BLACK AND DARK GRAY CHERNOZEMICS. HUMMOCKY TOPOGRAPHY DISRUPTS MANY USES.
SRC1	3H	FINE TO COARSE LOAMY RECENT FLUVIAL, LEVEL TO INCLINED UPPER TERRACES.	WELL TO MODERATELY WELL DRAINED BLACK CHERNOZEMICS. UNIT MAPPED ON UNDISSECTED UPPER TERRACES.
SRC2	3H	FINE TO COARSE LOAMY RECENT FLUVIAL. LEVEL TO UNDULATING LOWER TERRACES AND FLOODPLAINS; DISSECTED AND GULLIED.	RANGE FROM WELL DRAINED BLACK CHERNOZEMICS TO VERY POORLY DRAINED PEATY GLEYSOLS. UNIT STRONGLY DISSECTED BY ACTIVE AND ABANDONED DRAINAGE CHANNELS.

TABLE 5. ORIGINAL ESTIMATES OF SOIL UNIT SERIES COMPOSITION

UNIT	ZONE	MAJOR SOILS	MINOR SOILS
ADY1	1	ADY OBL 80-100	DWT RHG 0-20
ATL1	2H	ATL OBL 80-100	RBL 10-30
DEL1	1	DEL OBL 80-100	SHL RBL 0-10 BZC RHG 0-10
DVG1	3H	DVG OBL 60-90 ODG 10-30	SLOPE WASH GLEYED SOILS
ELB2	5H	ELB OGL 30-50	DGL 10-30
FSH1	3H	FSH OBL 40-60	EBL 20-40
FSH2	3H	FSH OBL 40-60	RBL 20-40 POT OHG 10-30
FSH3	3H	FSH OBL 40-60	TILL SUBSOIL VARIANTS 30-50
LLK1	1	LLK OBL 50-80 BPW RBL 20-50	
LTC1	3H	LTC OGL 50-80 DGL 10-20	LITHIC PHASES SLOPE WASH
RSN1	5H	RSN OGL 70-90	DGL 10-30
SPR1	5H	SPR OGL 40-60 EEB 10-30	SLOPE WASH LITHIC PHASES
SPY1	3H	SPY OBL 40-60 RBL 20-40	ODG 0-20 POT OHG 0-15

UNIT	ZONE	MAJOR SOILS	MINOR SOILS
SRC1	3H	SRC OBL 60-80 RBL 20-40	RHG 0-15
SRC2	3H	SRC OBL 30-50	CUHR 20-40 RHG 20-40

Note: The proportioms do not necessarily add up to 100% as the percentages of some minor included soils are not estimated

Step 1 - Assignment of Transects

The decision to evaluate map unit composition by the random transect method was taken after approximately 80% of the field mapping had been completed. Consequently, it was impossible to assign representative transects to each delineation of each map unit while in the field. Transects were selected in the office by examining every delineation of the map units chosen for evaluation and locating within them one or more transects which met specified criteria. The transects were oriented so as to traverse the complete geomorphic expression of the delineation in which they were located. Every attempt was made to ensure that the resulting transects represented the complete range of elevation, relief, drainage, vegetation, and tonal pattern as evidenced on air photos and topographic maps. A minimum of one transect was placed in each delineation of each map unit. Larger delineations had more than one potential transect assigned to them so that each transect represented about an equal area. The area represented by each transect was in the range of 50 to 100 hectares or about two to four times the area of a minimum size delineation at this scale of mapping.

Step 2 - Random Selection of Transects to be Investigated

Each transect located within a given map unit was numbered sequentially . After all delineations of a given map unit had been assigned one or more transects, the total number of assigned transects was recorded. These represented the total available population for that unit. A subset of

this total available population of transects was chosen randomly using a Fortran program provided by C. Libovitz, University of Alberta Computing Services. The program randomly selected twenty numbers between one and n, where n was the total number of available transects in a given map unit. The transects corresponding to the last ten of the twenty numbers chosen were then located on the soil map. This process was repeated for each of the map units chosen for study. Ten transects of each map unit were selected so as to permit rejection of some transects if problems such as restricted access precluded their use.

Step 3 - Selection of Appropriate Sample Interval and Sample Size

After choosing the transects to be sampled, it was necessary to determine what sample interval would be most appropriate. Steers and Hajek (1979) recommended dividing each delineation into 10 to 20 fixed length intervals which were allowed to vary between delineations. This had the advantage of providing a sufficiently large number of observations even on short transects. However it introduced difficulties into treatment of the results as the size of areas represented by each site was not comparable among map units or even different delineations. For this study , Arnold's (1977) recommendations regarding sample intervalswere adopted. The interval between observations along all but one set of transects was kept fixed at 125 metres or 150 single paces. This interval corresponded to

one-half of the diameter of a minimum size delineation at the 1:50,000 publication scale of survey. The fixed interval was chosen because it allowed for comparison of all results on an equal basis since all sites represented equal size areas of about one hectare. It also simplified the field procedures since different length intervals did not have to be computed and used for every delineation. An adjustment to this rule was made for SRC 2 map units which were inevitably narrow and possessed a central drainage channel which dictated a transverse orientation of transects. This unit was sampled consistently using an interval of one-half the normal distance or 75 paces. This provided the necessary number of observations along these short transects while maintaining uniformity of sampling interval at least within the map unit.

Selection of the total number of samples per transect was of course dependent upon the total transect length using this method. However, because of time constraints many of the selected transects had been purposely oriented in such a way within delineations that they did not exceed a maximum length of about 1500 metres. Thus most of the transects evaluated contained about 7 to 12 observation sites. An attempt was made to investigate at least five separate transects of each map unit. This number was chosen because it was realistically obtainable and had previously been reported as sufficient to characterize the major components of most map units (Steers and Hajek 1979; Amos and Whiteside

1975).

Step 4 - Selection of Appropriate Observations and Samples

Prior to actually sampling the transects in the field, decisions had to be made regarding what observations and samples were necessary to achieve the stated objectives of the study.

Information pertaining to various classifications of the soil was collected in order to test the correspondence of the sample data to the initial working legend. This information (see Appendix 1) included a determination of the series name (if defined), the contrast of the observed soil to the series which named the unit, the status of the observed soil; its classification, drainage class, parent material (mode and texture), slope and landform.

Data on site characteristics and profile morphology were collected in order to establish the variability of these characteristics by series and map unit. This enabled modal profile descriptions to be generated for these two strata. The observations collected for this purpose included thickness of the LFH, Ah, Ahe, Ae, and B horizons; depth to lime, mottles, water table, bedrock or second parent material; color (hue, value and chroma) of the A, B and C horizons (where present); type of B horizon; structure of the B horizon (grade, class, kind); surface stoniness; coarse fragment content of the B and C horizons; and field texture of the A, B and C horizons. These observations were recorded according to procedures outlined in the System of

Soil Classification for Canada (CSSC 1978a) and the CanSIS, Manual for Describing Soils in the Field (CSSC 1978b).

Laboratory determinations were conducted on samples taken from the surface (Ah, Ap or Ae) horizons and from the parent material below lime depth (Ck) wherever possible. These data were collected in order to determine mean values and confidence intervals for properties used to interpret the map units, as well as to provide quantitative data on which to base assessments of map unit differences. The laboratory results and derived classifications included determinations of sand, silt and clay content of the parent material, USDA texture, Unified classification, plastic limit, liquid limit, and plasticity index of the C horizon sample, percent calcium carbonate equivalent and pH of the C horizon, and pH and organic carbon of the A horizon sample. Examples of the forms used to record the field observations and laboratory data are included in Appendix 1.

Step 5 - Actual Field Implementation and Data Collection

After determining which observations and samples were required at each site, and randomly selecting transects to be sampled, the actual field implementation and data collection was undertaken. Each selected delineation and transect was located in the field. A starting point was identified at the intersection of the chosen transect and the delineation boundary. After locating the starting point, a compass bearing was taken to ascertain the direction to be followed by the transect. Exactly seventy five paces

(one-half of a normal sampling interval) were taken along the bearing direction. This step was included in order to ensure that all samples were taken within the true boundaries of the delineation and to exclude some anticipated boundary effects. At the initial site, and each subsequent site, an auger hole was bored to 100 cm or deeper if no lime was encountered. The observations detailed above (and in Appendix 1) were made and recorded and two samples were obtained, one from the surface (A horizon) and one from the parent material (Ck horizon). The next sample site was located by continuing in the bearing direction for 150 paces (one full sample interval) and then stopping and repeating the sampling procedure. Sampling continued in this fashion until the approaching delineation boundary was within 75 paces (one-half of a normal sampling interval) of the current sample site. The transect was then terminated.

Step 6 - Laboratory Determinations and Data Management

All field data were recorded on coding sheets prior to entry into a MICRO data management file (see Appendix 1). MICRO (Institute of Labor and Industrial Relations (ILIR) 1977) was chosen for its simplicity and ease of operation. A further advantage was that it interfaced interactively with an easy to use statistical package (MIDAS: Statistical Research Laboratory (SRL) 1976). These two mutually compatable software packages were found to considerably facilitate management, reduction and analysis of the data. Field samples were removed to the laboratory for analysis,

the results of which were also entered into a data management file. The laboratory methods used for each analysis were those recommended by McKeague(1978) for standard soil survey use (see Table 6).

Note on the Particle Size Determination Data

The values of percent sand, silt and clay as determined by the hydrometer method are included with the raw data reported in Appendix 1. Inspection of these values revealed that they were consistently higher for clay and lower for sand and silt than anticipated. Consequently, a subset of the total sample population was selected (28 samples) and reanalyzed using both the original hydrometer method and the pipette method (McKeague,1978). Comparison of the two sets of values determined by the hydrometer method revealed them to be highly correlated (S, r=.96; Si, r=.96; C, r=.99) and to be precise within the accepted limits of laboratory error (±2%). The values obtained by the hydrometer method versus the pipette method were also determined to be highly correlated (S, r=.99; Si, r=.97; C, r=.99) but the values of clay were consistently higher (9%) by the hydrometer method while those for silt and sand were lower by about 5% each.

Since most particle size data reported in the literature employs the pipette technique and since the initial hydrometer results were shown to be consistently different from corresponding pipette results, it was

Table 6. Methods of Laboratory Analysis used in this Study (after McKeague, 1978)

Analysis	Description	Reference
Percent Sand, Silt, Clay	<2mm Hydrometer Method Without pretreatment: except Calgon dispersion	Day(1965)
Atterberg Limits (WL, WP, IP)	As described	ASTM(1971)
pH (of A and C horizons)	pH in .01 M $CaCl_2$	Peech(1965)
Carbonate % (C horizon)	manometric procedure	LECO manual
Organic Carbon (A Horizon)	Dry Combustion- LECO induction furnace	Bremner and Tabatabai(1971) Tabatabai and Bremner (1970)
Electrical Conductivity of selected A,C Horizons	Conductivity cell in saturated extract	(N.A.)

decided to adjust the reported values of sand, silt and clay prior to analysis. This adjustment was done by means of the following equations:

1. NEW CLAY = 1.0*OLD CLAY - 9.23 (r=.99) (10.)

2. NEW SAND = 1.1*OLD SAND + 2.3 (r=.99) (11.)

3. NEW SILT = 100 - (NEW CLAY + NEW SAND) (12.)

The adjusted values were used to determine the means and confidence intervals for sand, silt, and clay which are referred to in the following discussion.

IV. RESULTS AND DISCUSSION

A. Introduction

The raw data upon which all aspects of the following discussions are based consists of the field observations made at each site along each transect and the laboratory results of analyses performed on soil samples taken from each site. This basic data set is listed in full in Appendix 2. The data is presented arranged alphabetically by Soil Unit (i.e. ADY 1) and by unique transect number within each soil unit. There are 15 different soil units and a total of 57 transects each containing data pertaining to 64 variables.

The abbreviations and codes used to identify the variables and variable values are fully documented in Appendix 1. All information appearing in Appendix 2 was stored in a MICRO data management file according to the format documented in Appendix 1. This was done in order to facilitate handling of such a large data set, particularly as regards data reduction and analysis. A few variables for which data were initially recorded as indicated on the sample field data sheet (see Appendix 1) are not listed in Appendix 2. They were judged to contain too few valid observations to be of consequence in data analysis.

Description of the Variables

The data obtained for this study were grouped into two categories for purposes of analysis. Group one contained

analytical variables which were measured on interval or ratio scales. This group consisted of measured, continuous parameters such as thickness of LFH, Ah, Ahe, Ae or B horizons; depth to lime or second parent material; coarse fragment content; or slope as well as the laboratory determined values of percent sand, silt, clay, liquid limit, plastic limit, plasticity index, A and C horizon carbonate content and pH; C horizon electrical conductivity and A horizon organic carbon. These variables were suitable for analysis by normal statistical techniques designed for parametric data. They were, however, investigated to see if they met the basic requirements for each technique. Most parametric methods require that the variables have a normal distribution and finite variance. These requirements are usually assumed to be met by randomly collected soil property measurements. While anticipating that the data collected for this study would also meet these criteria, it was considered prudent to make at least rudimentary, visual inspections of group one variables to determine if significant, obvious, departures from normality were evident. This was done by computing descriptive statistics including skewness and kurtosis for all non missing cases of each analytical variable (MIDAS:DESCRIBE command) and by plotting histograms to display the frequency distributions of values for each variable. (MIDAS:HISTOGRAM command) No rigorous techniques were employed to test the conformity of the observed distributions to the assumed normal

distribution. None of the statistical tests for normality can claim universal acceptance or applicability (SRL, U of M 1976). However, most statistical techniques used in analysis of soil variability are quite robust and can withstand significant departures from normality (Liu and Thornburn 1965). Most variables had acceptably low values of skewness and kurtosis and had frequency distributions resembling a normal distribution.

The second group consisted of categorical parameters which were measured on nominal or ordinal scales. All the remaining variables fell into this group. Some parametric techniques can successfully utilize this type of data but others such as analysis of variance and computation of means and variances are inappropriate. Non parametric techniques such as determinations of medians, quartiles, modes or one way to n-way contingency tables are generally used for analysis of such data. Sample histograms of these variables were observed to be highly skewed and anormally distributed, particularly within defined strata (i.e. Soil Series, soil units). Consequently, analytical treatment of these variables was minimal.

B. Simple Measures of Purity or Percent Correctness

A great deal of information can be obtained by simply determining the percentage of total observations within a given stratification level (soil unit) which meet certain criteria for membership in any given class. In this study,

classes were arbitrarily defined and decisions regarding class membership were primarily subjective. Thus at each site the observed soil was assigned to a given series, if applicable, as well as to various other classes such as contrast, parent material, mode of deposition and texture, soil Order, soil Subgroup, landform and drainage. It was assumed that the surveyor was capable of correctly identifying the classes into which each site fell. Consequently, the percentage of observations within each soil unit which met the criteria for membership in any given class provided an estimate of the purity of that unit with respect to each classification level.

Table 7 summarizes the 'percent purity' of the tested soil units relative to several different classifications. Naming series refers to the percent of total observations within each map unit which were judged to belong to the series which names the map unit. No and low contrast soils were those judged to be either the naming series or very similar soils which differed little from the naming soil and would be interpreted similarly for most uses. Recognized soils included all soils which were recorded in the original soil unit descriptions as being likely to occur in the unit, regardless of their similarity to the naming series. The soil Order and soil Subgroup classes contained all sites which, at the Order or Subgroup level, had the same classification as the naming series. Three parent material variables were analysed. The percentage of sites in which

Table 7. Percent 'Purity' of Soil Units for Selected Characteristics

SOIL UNIT	NO. SITES	NAMING SERIES	NO & LOW CONTRAST	REC. SOILS	SOIL ORDER	SUB GROUP
ADY 1	45	27	89	93	100	78
ATL 1	37	89	89	94	100	95
DEL 1	43	62	81	77	98	79
DVG 1	26	46	61	58	96	85
ELB 2	20	10	45	80	50	15
FSH 1	48	77	95	88	96	79
FSH 2	35	34	65	71	75	34
FSH 3	21	47	86	86	96	85
LLK 1	41	41	95	95	93	44
LTC 1	35	20	55	49	51	26
RSN 1	28	14	67	40	61	35
SPR 1	37	51	68	70	78	73
SPY 1	28	68	81	79	90	75
SRC 1	22	41	64	68	82	50
SRC 2	33	10	42	48	52	27
MAP AVERAGE		42	73	74	80	56

SOIL UNIT	NO. SITES	TOP PARENT MAT.		COMPL. PGM.	DRAINAGE	LANDFORM
		MODE	TEXTURE			
ADY 1	45	38	82	20	91	90
ATL 1	37	97	86	86	100	86
DEL 1	43	74	76	72	86	98
DVG 1	26	62	62	58	96	100
ELB 2	20	90	95	60	65	60
FSH 1	48	94	100	85	94	87
FSH 2	35	94	100	88	65	82
FSH 3	21	90	86	71	90	90
LLK 1	41	98	98	95	75	60
LTC 1	35	80	91	74	100	80
RSN 1	28	50	68	25	89	79
SPR 1	37	73	81	54	84	92
SPY 1	28	86	89	79	85	96
SRC 1	22	95	86	59	59	100
SRC 2	33	79	73	58	18	87
MAP AVERAGE		81	86	66	79	85

the upper parent material mode and texture were correctly predicted in the original soil unit descriptions was noted under the headings 'Mode' and 'Texture' in Table 7. Complete PGM referred to those sites in which mode and texture of both upper and lower parent materials (if present) conformed to the described soil unit description. The headings 'Drainage' and 'Landform' document the percentage of sites in each unit at which the encountered drainage class and landform type was as defined for the unit.

It was readily apparent that certain of the map units listed in Table 7 had acceptably high degrees of purity while certain others appeared at first glance to have a very poor predictive capacity. The relatively pure units were taken to be those in which the naming soil constituted 40% or more of the total observations in that unit or perhaps more importantly, greater than 65% of the unit consisted of the naming series and similar low contrast soils. These units were ATL 1, DEL 1, DVG 1, FSH 1, FSH 3, LLK 1, SPR 1, SPY 1 and, marginally, SRC 1. A high proportion of all the observations taken in these units conformed to the expected values of the various examined classes. Since these units covered a very large portion of the entire mapped area it was possible to conclude that this portion of the mapped area was reasonably well mapped and accurately described.

The soil units which initially showed lower percent purities included ADY 1, ELB 2, FSH 2, LTC 1, RSN 1, and SRC 2. These units deserved closer scrutiny to determine if they

were in fact poorly mapped, or just poorly described, and if so if adjustments to the descriptions could resolve the apparent poor predictive capacity.

ADY 1

ADY 1 unit was observed to contain a very high proportion of no and low contrast soils (80%) and to be incorrect mainly with regard to series classification and complete parent material description. Thus the soils encountered in ADY 1 unit differed from Academy Series mainly with respect to their parent material mode of deposition. This inconsistency arose from the fact that Academy Series was initially defined very broadly. It was difficult to decide, prior to examination of the results of this study, whether the parent material in ADY 1 areas was predominantly till or consisted of a silty aeolian or glaciolacustrine veneer overlying till. Consequently, a compromise solution was initially proposed in which the dominant parent material was assumed to be till, but the till was described as having a 'washed' appearance or silty surface layer. This solution was not acceptable when decisions had to be made during transects about whether a site was till or not till. Additionally, it was noted during transect sampling that a readily apparent difference existed between the overlying silty veneer (where it occurred) and the underlying, more compact, moister till. Thus a second series which had initially been included in the Academy definition was separated during transect sampling. This soil

was called Rockyview and was defined as an Orthic Black developed on a fine silty aeolian or glaciolacustrine veneer overlying fine silty to fine loamy till. Therefore the low 'purity' observed for ADY 1 unit was predominantly a consequence of splitting the initial definition of Academy Series and creating a second series to recognize slight changes in parent material properties and origin relative to Academy. When this new series was included in the unit name and the soil unit was recognized to be a complex of two slightly different parent materials, the low percent purity estimates were considerably improved. The two naming series of a redefined RKAD 1 unit made up 49 (RKV) and 27 (ADY) percent of the unit respectively for a total of 76 percent purity with respect to the two naming series . Similarly when the parent material was defined as being either a thin silty veneer overlying till or entirely till then the parent material accuracy improved to 96%. This example illustrated a soil unit which was not poorly mapped but simply incorrectly described. Once recognized as a complex unit and described accordingly, the predictive accuracy of ADY 1 soil unit (now RKAD 1) improved dramatically.

ELB 2, RSN 2

ELB 2 and RSN 2 units also showed low purity. RSN 2 was included with ELB 2 in this discussion since both were essentially similar in initial definition and both were found to contain similar variabilities and soil inclusions. Initially both were defined as predominantly Orthic Gray

Luvisols with Ahe horizons up to but rarely greater than 5 cm thick. ELB 2 was assumed to occur predominantly on fine clayey glaciolacustrine materials and RSN 1 on fine clayey till. Observations taken along the selected transects in both units indicated that the Ah or Ahe horizons were consistently greater than the 5 cm estimated. Consequently, many of the pedons were classified as Dark Gray Luvisols. Some had little evidence of eluviation and were classified in the Chernozemic Order as Orthic Dark Grays or Orthic Blacks even though the areas were heavily treed and the dominant climate was cool and moist (5H). Both units contained some Orthic Gray Luvisols (ELB 2 - 15%, RSN 1 - 35%) but they were subdominant soils at best. Consequently, the transect data indicated that a change in classification from Orthic Gray Luvisol to Dark Gray Luvisol was necessary for the dominant soil in both these map units. This did not result in dramatic improvements to series classification accuracy but when the similar soils (Orthic Dark Grays and Orthic Blacks) were included in the analysis both units were observed to contain about 55% no and low contrast soils and between 15 and 35 percent Orthic Gray Luvisols. The ELB 2 analysis was affected by data from one transect which was improperly mapped and contained a predominance of poorly drained soils. Otherwise, both units could be seen to have a similar assemblage of soils at least insofar as classification was concerned. In further examining these units, ELB 2 was observed to contain till at or near the

surface at 40% of the sites while RSN 1 unit contained glaciolacustrine materials at 45% of the sites. Consequently, it was concluded that no effective separation of parent materials was being achieved by having two different map units. A new, complex, map unit (ELRS 1) was defined which was allowed to include highly varying amounts of till or glaciolacustrine but since both parent materials were fine clayey in texture interpretations made for the unit were not greatly affected. ELB 2 and RSN 1 are examples of units which were neither well mapped nor well described. The observations obtained during transect sampling allowed for a marginally improved description of a new complex unit but the mapping accuracy remained suspect. The new complex unit must simply be described as highly variable with respect to both parent material origin and Subgroup classification. It was not surprising to note that both RSN 1 and ELB 2 were mapped under forest in non definitive landscape positions. Consequently, many of the clues necessary for accurate determinations of map unit characteristics from air photos were absent or supressed for these units.

FSH 2, FSH 3

FSH 2 was observed to have a poor predictive capacity with respect to naming series, Subgroup classification and drainage (Table 7). This low observed purity did not in this case indicate inaccurate mapping or poor description. Rather it served to emphasize that some justification for

recognizing FSH 2 as a separate map unit distinct from FSH 1 existed, and that FSH 2 had been correctly mapped and described. FSH 2 unit was defined as having a significant component of imperfectly to poorly drained soils and a somewhat more variable assemblage of better drained soils than FSH 1. The collected data would seem to support this. Thirty percent of the soils were Gleysolic or gleyed . Additionally, Rego and Calcareous Black pedons were far more common than in FSH 1 units (28% total).

FSH 2 then is an example of a unit which intentionally lacked high predictive capacity with respect to the naming series and certain of its characteristics (in this case drainage) . FSH 2 predicted not only the occurrence of the naming series but also indicated that a substantial component of poorly drained and other different soils were to be anticipated. In a similar fashion, FSH 3 unit was defined as differing from FSH 1 mainly due to the presence of till within the control section over large portions of the unit. Examination of the parent material composition of these units revealed that 41% of the sites within FSH 3 unit had till at or near the surface while in FSH 1 unit less than 15% of the sites had till in the control section. This then would also appear to be a valid separation, though perhaps it is not of great significance since the till tended to be similar in texture to the glaciolacustrine parent materials of FSH 3 unit.

LTC 1

LTC 1 unit had a low percent purity with respect to soil classification at all levels as well as relative to soil contrast. This unit was more variable than first described and contained more soils with Ah or Ahe horizons greater than 5 cm thick than anticipated. Consequently, the dominant soil for the unit would be better classified as a Dark Gray Luvisol and similar low contrast soils would include Dark Gray and Orthic Black Chernozemics. Orthic Gray Luvisols should probably have been recognized as subdominant, medium contrast soils. When these adjustments were made to the soil unit description, series classification accuracy remained at only 25% but percentage of no and low contrast soils improved to 70% and consequently the interpretive capacity of the unit was improved.

SRC 1, SRC 2

The final units deserving of comment were SRC 1 and SRC 2. Both are alluvial soil units and as such were anticipated to be highly variable. The intent of defining two units was to attempt to separate the upper, more stable, less variable, alluvial terraces from the lower, more variable ones. The data in Table 7 would appear to support this separation as in all cases, SRC 1 unit had a higher percentage 'purity' than SRC 2. Sarcee was the single most extensive Series in SRC 1 soil unit. It was not the dominant Series in SRC 2 map unit and was in fact secondary to Rego

and Gleyed Rego, Dark Grays and Gleyed Cumulic Humic Regosols developed on the same parent materials. SRC 2 is an example of a convenience unit where, in the opinion of the surveyor, the mapped area was not of sufficient extent and the dominant soil was not sufficiently different to justify the creation and definition of a new Soil Series and accompanying map unit or units.

Summary

In summary, examination of Table 7 revealed that many of the major soil units had acceptably high levels of 'purity' or predictive accuracy. Among those with low observed predictive accuracy, several were intended to be variable units with lower purities than their associated pure counterparts (FSH 2, FSH 3, SRC 2). One (ADY 1) was observed to have a low purity of naming series and parent material as a result of the decision to refine an original broad definition of Academy Series in order to recognize two slightly different parent material conditions. A slight revision to the description corrected the low purities observed for ADY 1 unit. Three units were both incorrectly described and had inherently high variability which precluded improvements in the accuracy of their mapping at this scale. They were ELB 2, RSN 1 and LTC 1. ELB 2 and RSN 1 were joined to form a new unit ELRS 1 since no effective separations were maintained by keeping the two separate units. LTC 1 had the classification of its dominant soil changed from Orthic Gray Luvisol to Dark Gray Luvisol. This

did little to improve the series purity but did improve the purity with respect to low contrast soils. Finally, consideration of the map averages computed for each purity determination appeared to indicate that, on the whole, the area was adequately mapped. Naming series was mapped correctly 42% of the time; no and low contrast soils were found at 73% of all sites and the parent material at 66% of the sites corresponded exactly to that described for the main soil of the units. These values are similar to those which have been reported in the literature for order 2 and 3 survey map units (Beckett and Webster 1971).

C. Confidence Intervals for Series Composition of Soil Units

The 90 percent confidence limits for series composition of the investigated map units were computed in order to effect a more quantitative appraisal of soil unit composition than permitted by simple assessments of percent purity as previously described. The confidence intervals were determined using both Arnold's (1979) graphical technique and a computer procedure which calculated the confidence interval of the mean for n sample means (MIDAS: DESCRIBE COMMAND). These confidence intervals, as well as the original legend estimates of series composition for the major Soil Series recognized in each map unit are listed in Table 8.

Both the graphical method and the computer calculation of sample mean confidence intervals yielded comparable

Table 8. 90 percent Confidence Intervals for Component Composition of Soil Units

SOIL UNIT	# SITES	SERIES OR CONTRAST	# RECOG	CONFIDENCE INTERVAL GRAPHICAL	CONFIDENCE INTERVAL COMPUTED	# MEANS	ORIGINAL ESTIMATES
ADY 1	45	ADY	12	18-40	18-45	5	80-100
		RKV	22	36-60	30-60	5	-
		EBO	3	-	-	-	-
ATL 1	37	ATL	33	79-96	85-95	5	80-100
DEL 1	35	DEL	27	62-85	55-71	6	90-100
		RKV	6	7-25	(13-34)	3	-
DVG 1	25	DVG	11	30-60	(26-75)	3	60-90
ELB 2	20	ELB	2	5-30	(13-23)	2	30-50
		POT	6	20-55	(54-100)	3	0-15
FSH 1	48	FSH	37	65-86	60-89	6	40-60
FSH 2	35	FSH	12	24-50	23-45	5	40-60
		POT	8	15-35	(19-36)	4	10-30
FSH 3	21	FSH	10	30-65	27-76	4	40-60
		LCON	9	28-62	(25-66)	3	30-40
LLK 1	41	LLK	17	30-54	31-54	5	50-80
		BPW	11	18-40	(23-40)	4	20-50
		CABL/LG	7	8-28	-	-	-
LTC 1	35	LTC	7	10-30	(28-51)	3	50-80
		LCON	8	15-40	-	-	10-20
		HCON	9	14-38	(15-46)	4	10-30
RSN 1	28	RSN	4	6-28	(2-55)	2	70-90
		LCON	16	40-70	(46-65)	4	10-20
SPR 1	37	SPR	19	39-65	(33-80)	3	40-60
		HCON	7	(12-32)	13-32	4	10-30
SPY 1	28	SPY	19	48-75	54-88	5	40-65
		GLEYED	4	10-30	-	-	0-15
SRC 1	22	SRC	9	25-55	(58-71)	2	60-80
		LCON	5	10-40	-	-	20-40
		MCON	6	15-46	13-42	3	0-15
SRC 2	33	SRC	3	5-20	(14-30)	2	30-50
		LCON	11	23-48	18-53	5	20-40
		MCON	18	14-38	(22-32)	4	-
		HCON	11	23-48	23-45	5	10-40

Transects with means of zero excluded by computer when computing confidence intervals for a given series.

results. Discrepancies were due mainly to the characteristics of the computer procedure. It treated values of zero (0) for the proportion of a given soil in a given transect as missing data and excluded them from the analysis. Consequently, transects which did not contain any occurrences of a particular soil were not used to compute the confidence intervals for the proportions of that soil expected in a given map unit. Confidence intervals computed on less than the total number of transects conducted for a given map unit are enclosed in brackets in Table 8. They should be rejected in favour of the values computed by the graphical method. Since the two methods yielded comparable results and since the graphical method utilized all the observations made in a particular soil unit, the following discussion of soil unit composition will refer to the graphically obtained results.

In general, the determined confidence intervals defined the probable mean values of series proportions in the map units at an acceptable level of accuracy for the major soils of each map unit. Most proportions were predicted to within plus or minus 10 to 15 percent of the true population mean at 90 percent level of confidence. This corresponded reasonably well with the level of accuracy currently attempted for estimates of map unit composition in similar soil surveys at similar scales. It would therefore appear that the number of transects conducted was sufficient, in most cases, to provide the required level of accuracy at the

chosen 90 percent confidence level.

The determined confidence levels also provided a quantitative evaluation of map unit composition which could be compared to the original estimated compositions to determine which soil units were well mapped and which were not. The objective was primarily to evaluate the degree of correspondence of the determined limits to the estimated limits. However, the technique was found to provide great potential for producing accurate soil unit descriptions at any stage of legend development. The discussion of the individual soil unit evaluations focuses primarily on the degree to which the initial estimates corresponded to the actual determined values, and the apparent reasons for non-correspondence, if present. However, reference is made to possible application of the results to redefinition and improved description of certain poorly described soil units.

ADY 1

The major Series in ADY 1 unit were determined to be Rockyview (48± 12%) and Academy (29± 11%). The initial estimate was that 80 to 100 percent of the unit consisted of Academy Series. Since Academy Series was initially defined to include pedons now characterized separately as Rockyview and Academy, the agreement between the original estimates and the transect evaluations was fairly good. The transect sampling revealed that there were actually two readily distinguishable series in ADY 1 unit rather than the initial, single, broadly defined Academy Series. This

allowed the description of ADY 1 to be altered accordingly.

ATL 1

This unit was determined to contain 87± 9 percent Antler Series and no other major, subdominant soils. This agreed extremely well with the estimated proportions of 80 to 100% Antler Series in ATL 1 unit. The unit was therefore well mapped and well described.

DEL 1

This unit was found to contain 74± 11 percent Delacour Series and 16± 9 percent Rockyview Series. The initial estimate of 80 to 100 percent Delacour Series was obviously an overestimate but since Rockyview is quite similar to Delacour, the incorrect estimate would not significantly affect most interpretations. The general unit concept of predominantly well drained Delacour Series and no significant subdominant, limiting, soils was confirmed by the transect evaluations. The only question raised by these results was whether a separate complex unit, already defined as DERK 1, was actually necessary. It was created to recognize minor occurrences of silty, Rockyview Series in dominantly Delacour areas. Had this analysis been carried out earlier, additional field investigations of DERK 1 delineations could have been conducted to determine if this unit actually contained a significantly greater proportion of Rockyview Series than DEL 1. If not, the two units could have been consolidated, thereby simplifying and improving the legend through the elimination of non-distinctive units.

DVG 1

This unit was estimated to contain 60 to 90 percent Dunvargan Series and actually found to consist of 45± 15 percent Dunvargan. The agreement was not as good as was anticipated for this unit. The explanation for the discrepancy lies in the fact that more soils containing some glaciolacustrine parent material within their control sections were encountered than had been originally estimated. DVG 1 units were mapped adjacent to FSH 1 units and were transitional between the entirely glaciolacustrine soils of the valley bottoms and the till soils found on ridges. It was thought that little glaciolacustrine sedimentation had occurred in this landscape position. Evidently this assumption was incorrect and the intermediate landscape positions occupied by DVG 1 soil units were in fact subject to depositon of glaciolacustrine sediments. Seven pedons consisted of soils developed on thin glaciolacustrine overlying till for a confidence interval of 33± 15 percent. It would be necessary to modify the description of DVG 1 unit such that these medium contrast glaciolacustrine over till parent material soils were recognized in order to achieve the desired correspondence between the determined composition and the described composition.

ELB 2

This unit was determined to be incorrectly described in the original legend. It had been estimated to contain 30 to

50 percent Elbow Series and zero to 15 percent Pothole Creek Series. Transect evaluations indicated that Elbow Series made up only 18± 13 percent of the unit and Pothole Creek comprised about 38± 17 percent. No other single series formed more than 20 percent of the unit so an improved definition was difficult to produce. The determined inaccuracy was traced to the presence of thicker Ah horizons than originally estimated thereby changing the classification of numerous included pedons, and to the presence of till parent materials at depth and to the surface within the unit. Since RSN 1 unit was similarly variable and unpredictable, it was decided to join the two units on the final legend to produce a single poorly predictive unit rather than two separate units with overlapping compositions.

FSH 1

This unit was found to contain about 75± 10 percent Fish Creek Series. The original estimates were that 40 to 60 percent of the unit was Fish Creek and a further 20 to 40 percent consisted of similar, unnamed soils, mostly Eluviated Blacks and Dark Grays. The transect sampling did not uncover significant numbers of these anticipated similar soils and their prediction was concluded to be irrelevant. The determined proportion of Fish Creek Series in this unit was therefore in good agreement with the general unit concept of predominantly Fish Creek or similar, non-limiting soils. The unit was found to actually be 'purer' than had

been anticipated. It was proposed that the unit description could be modified to detail the relatively high proportion of Fish Creek Series actually found within the unit during transect sampling.

FSH 2

This unit was determined to contain 37± 13 percent Fish Creek Series and 25± 10 percent Pothole Creek Series. This represented very good agreement with the initial estimates of 40 to 60 percent Fish Creek Series and 10 to 30 percent Pothole Creek Series. The original estimate of the proportion of Fish Creek Series in the unit was somewhat high but the discrepancy was mostly accounted for by marginally different, Rego Black or Gleyed Black pedons. This observation was repeated on other soil units which occurred on rough topography or included significant gleysolic soils. These areas tended to contain a more complex assemblage of pedons which differed slightly, in one or more respects, from the dominant, well drained pedon. This was an aspect of the soil-landscape model which should have been obvious to the surveyor immediately, but which was only recognized when the disciplined sampling approach of the transect method was utilized.

FSH 3

This unit was determined to contain 48± 18 percent Fish Creek Series and 45± 17 percent similar soils, mostly Orthic Black soils on glaciolacustrine overlying till. The original estimates were for 40 to 50 percent and 30 to 40 percent of

these two soil components respectively. Consequently, agreement between the determined composition and the estimated composition was good. The unit was demonstrated to be well described and well mapped. It was noted that the confidence intervals determined for this unit were wider than for any other major soil component of any other soil unit. This high variability was not necessarily regarded as indicative of poor mapping. By including more variable delineations in FSH 3 unit, they were excluded from the more 'pure' FSH 1 unit, thereby maintaining a high predictive accuracy and narrow range of dominant soil composition for FSH 1 unit. The relatively high series composition variability of FSH 3 unit was therefore thought of as intrinsic to and diagnostic of FSH 3 unit. It was concluded that the transect data appeared to justify the distinction made between FSH 1 and FSH 3 units. They differed both with regard to absolute composition of recognized soils and relative degree of variability of soil components.

LLK 1

This unit was determined to contain 42± 12 percent Lloyd Lake Series, 29± 11 percent Bearspaw Series, and 18± 10 percent unnamed Calcareous Black soils. This compared favourably with the original estimates of 50 to 80 percent Lloyd Lake Series, and 20 to 50 percent Bearspaw and related Series. The transect evaluation allowed for a more precise quantification of the proportions of all Series in LLK 1 unit but their relative rankings had been correctly

estimated. It was noted the the transect technique encouraged the recognition and quantification of the principal subdominant series included in this unit since they had to be assigned to a classification and series for transect purposes whereas in normal field mapping they were often just classed as similar, non-limiting soils. All three of the principal recognized series in this unit form on the same parent material and exhibit similar properties. Consequently, despite the taxonomic differences noted, most soils within this unit would be expected to be similar with respect to most potential uses.

LTC 1

Confidence interval determinations of LTC 1 unit components confirmed the observation made in a previous section regarding the poor quality of the original description of this unit and its subsequent mapping. Only 20± 10 percent of the unit was found to be Leighton Centre Series compared to the original estimate of 50 to 80 percent. Low contrast, similar soils were originally estimated to comprise 10 to 20 percent of the unit but were determined to make up about 28± 12 percent. These low contrast soils differed from Leighton Centre as originally described by possessing Ah horizons in excess of the 5 cm thickness allowed for an Orthic Gray Luvisol. The unit should likely have been described as dominantly composed of Dark Gray Luvisols (28± 12%) with a subdominant assemblage of Orthic Gray Luvisolic soils (20± 10%). High contrast

soils including both slope wash and lithic profiles were originally estimated to comprise 10 to 30 percent of the unit. The established confidence interval of 26± 12 percent was slightly higher than the estimate, but it indicated that the original estimates at least recognized the presence of these significant components at an approximately correct level.

RSN 1

This unit was previously identified as having a low percent purity. The determined proportion of Robinson Series, as originally described, was 17± 11 percent compared to the initial estimates of 70 to 90 percent. Low contrast soils, consisting mostly of Dark Gray Luvisols and similar soils with Ah horizons greater than 5 cm thick developed on either fine clayey till or glaciolacustrine were determined to comprise 55± 15 percent of the unit. Consequently, it was determined that the dominant soil should be redefined as a Dark Gray Luvisol and that RSN 1 unit should be joined with ELB 1 unit since neither was highly definitive and both contained significant amounts of soils expected in the other unit.

SPR 1

The determined confidence levels for SPR 1 unit agreed extremely well with the original estimates. The unit was estimated to contain 40 to 60 percent Spruce Ridge Series and determined to contain 52± 13 percent. High contrast lithic and slope wash profiles were originally estimated to

comprise 10 to 30 percent of the unit and were computed to form about 22± 10 percent of the unit. Thus, while the unit was found to contain a relatively large component of high contrast soils, these soils were recognized and described in the original legend estimates. The unit was well described and about as well mapped as possible given the encountered variability.

SPY 1

This unit was originally estimated to contain 40 to 60 percent Spy Hill Series and zero to 15 percent poorly drained soils. Transect determined confidence levels were 61± 14 percent Spy Hill Series and 20 ± 10 percent imperfectly drained soils. No significant component of poorly drained soils was computed. The unit was intended to contain mostly Spy Hill Series with a minor but consistent component of poorly drained soils. As such, the determined composition supported this description although the actual proportion of Spy Hill Series was greater than anticipated and the wet soils were predominantly gleyed Subgroups rather than gleysols. In general, however, the unit was acceptably well mapped and described.

SRC 1

This unit was estimated to contain 60 to 80 percent Sarcee Series, 20 to 40 percent similar, low contrast soils and less than 15 percent high contrast soils (primarily gleysols). It was found to contain 40 ± 15 percent Sarcee Series and 25 ± 15 percent similar, low contrast soils. The

main soils were recognized and ranked correctly, but the proportion of Sarcee Series in the unit was somewhat overestimated. Transect determinations revealed that 30 ± 15 percent of the unit was made up of medium contrast soils, principally those with gleying or gravel within the control section. These had not been recognized in the initial description and the description should be modified to acknowledge their presence. Otherwise, SRC 1 was reasonably well mapped and described.

SRC 2

This unit was determined to differ significantly in series composition from the original description. Original estimates were that Sarcee Series made up 30 to 50 percent of the unit; similar, low contrast soils made up 20 to 40 percent and high contrast soils (mostly gleysols) made up 20 to 40 percent. The determined composition was Sarcee 12 ± 8 percent; low contrast, similar soils 35 ± 13 percent; medium contrast soils having gleying or gravel in the control section 26 ± percent; and high contrast gleysols or gravelly soils 35 ± 13 percent. The unit obviously was not dominated by Sarcee Series and should consequently not have been named after Sarcee. However, it was convenient to continue using the name Sarcee in order to avoid the requirement of naming, describing, and interpreting a new dominant Series. Since Sarcee and similar, low contrast soils collectively made up about 47 percent of the unit, it was considered legitimate to adopt this approach and refrain from creating a new soil

name.

Summary

In summary, many of the observations made in the previous discussion dealing with percent 'purity' were confirmed by analysis of the 90 percent confidence interval determinations. Both analyses indicated that ELB 2, LTC 1 and RSN 1 units were inaccurately described and poorly mapped. The remaining units were correctly described with regard to relative rankings of dominant and subdominant soils although the original estimates of proportions were not as precise as those produced by the transect method. The improved accuracy, relative to the original field estimates, provided by confidence interval determinations of series composition was recognized to produce superior soil unit descriptions. In addition, the discipline enforced by use of the technique contributed to the recognition and description of all major constituent soils in each soil unit; a practice which had been inconsistently applied in the original mapping.

D. Descriptive Statistics for Selected Soil Properties

Certain of the measurements taken in the field and all of the laboratory determined data were suitable for treatment as analytical variables. For these data, calculation of means, confidence intervals and coefficients of variability was both possible and desirable. The calculations were conducted principally to define modal

values for each variable for each Soil Series or soil unit. Additionally, the results were scrutinized to ascertain which variables were most useful for discriminating between the various defined classes of soil. This investigation of the absolute magnitude and relative variability of the various soil properties and soil classes provided insights into the reliability of certain properties as discriminator variables and the validity of the arbitrarily assigned soil classes.

Soil Property Mean Value Estimations

The 90 percent confidence intervals for selected soil properties for all the investigated soil units and Soil Series are listed in Tables 9 through 11. It is possible, through consulting these tables to determine the confidence interval for the mean value of any reported property for any given map unit or Soil Series.

For example, a modal profile description for Academy Series may be organized which specifies that the average Ah thickness lies between 13 and 19 cm; the average thickness of the B horizon is 21 ± 4 cm and the average depth to lime is 37 ± 6 cm. The average coarse fragment content for the soil is between 4 and 7 percent and the slope is between 3 and 4 percent. Additionally, average values can be reported for plastic limit (18 to 21%), liquid limit (30 to 34%), Plasticity Index (11 to 14%), percent sand (25 to 32%), percent silt (44 to 49%), percent clay (23 to 27%), A horizon pH (6.5 to 7.1), C horizon pH (7.7 to 7.9), organic

Table 9. 90 percent Confidence Intervals for Selected Morphological Properties

STRAT. SOIL UNIT	LEVEL SOIL SERIES	Ah(Ahe) THICK-NESS	B THICK-NESS	LIME DEPTH	2ND PM DEPTH	COARSE FRAGMENTS	% SLOPE
ADY 1		16-23	20-26	37-49	63-74	2-4	3-4
ATL 1		17-21	26-33	43-51	-	9-11	4-5
DEL 1		16-19	28-33	42-50	68-84	3-4	2-3
DVG 1		18-22	32-44	54-66	54-75	3-5	6-8
ELB 2		(7-11)	37-50	53-65	65-87	1-5	6-11
FSH 1		21-24	28-33	49-55	-	0-3	4-5
FSH 2		18-22	19-48	32-48	-	-	3-4
FSH 3		18-23	27-34	46-58	70-93	-	3-4
LLK 1		19-24	18-25	35-50	-	0-3	4-6
LTC 1		13-23	47-58	68-81	-	9-11	13-19
RSN 1		9-28	43-52	63-73	-	3-9	7-10
SPR 1		1-14	36-51	52-66	51-89	16-26	23-31
SPY 1		13-19	22-30	36-47	-	16-27	7-13
SRC 1		24-32	39-63	36-47	62-77	-	1-2
SRC 2		18-25	30-54	33-57	73-113	10-50	1-2
	ADY	13-19	17-25	31-43	-	4-7	3-4
	ATL	17-21	26-33	44-53	-	9-11	4-6
	BPW	14-19	-	-	-	0	5-9
	DEL	16-18	28-34	44-51	-	3-4	2-3
	DVG	20-26	33-43	57-70	-	4-9	6-11
	EBO	13-17	-	13-20	56-84	1-2	2-3
	ELB	(0-12)	33-46	47-79	-	-	2-15
	FSH	22-25	26-31	50-55	-	-	4-5
	LLK	20-26	19-26	41-52	-	0-3	3-4
	LTC	(2-3)	50-67	62-83	-	7-10	6-17
	POT	15-21	33-51	45-72	-	-	2-5
	RKV	17-20	23-29	41-49	66-75	1-2	2-3
	RSN	(2-5)	43-68	62-78	-	3-5	5-16
	SPR	(2-4)	43-62	57-69	-	17-23	19-28
	SPY	13-15	22-31	35-45	-	16-31	7-12
	SRC	23-32	39-70	56-105	-	-	1-2

Table 10. 90 percent Confidence Intervals for Selected Physical Properties

STRAT. SOIL UNIT	LEVEL SOIL SERIES	PLASTIC LIMIT	LIQUID LIMIT	PLASTICITY INDEX	% SAND	% SILT	% CLAY
ADY 1		20-21	32-34	12-13	20-24	49-52	26-29
ATL 1		22-23	35-38	13-15	15-18	50-52	30-34
DEL 1		18-20	32-35	14-15	28-33	39-43	27-30
DVG 1		22-24	39-44	17-21	8-12	42-48	41-49
ELB 2		23-25	46-55	23-29	5-10	34-42	50-60
FSH 1		24-26	49-53	24-27	5-7	34-39	54-60
FSH 2		22-25	42-46	19-22	5-7	42-47	47-53
FSH 3		24-26	45-51	20-25	5-8	35-44	50-59
LLK 1		22-24	35-38	13-15	9-12	56-60	29-34
LTC 1		18-21	30-34	12-14	22-28	47-52	24-28
RSN 1		21-23	39-46	18-23	11-17	42-48	37-45
SPR 1		19-22	31-39	13-18	23-31	40-46	26-35
SPY 1		22-26	37-40	13-16	19-27	45-50	27-32
SRC 1		21-24	30-36	9-12	25-38	44-53	18-24
SRC 2		21-24	34-38	11-15	28-36	43-48	20-16
	ADY	18-21	30-34	11-14	25-32	44-49	23-27
	ATL	22-23	35-37	13-14	15-19	51-53	30-33
	BPW	22-25	33-39	11-14	8-15	54-59	28-37
	DEL	19-20	35-36	15-17	30-32	37-39	30-32
	DVG	20-23	35-41	15-18	10-17	46-52	33-42
	EBO	19-23	34-40	14-17	6-26	43-58	30-38
	ELB	19-24	35-51	15-27	4-9	38-56	37-55
	FSH	25-26	49-52	24-27	5-6	34-40	56-61
	LLK	21-24	33-39	12-16	7-13	54-61	27-37
	LTC	17-25	29-38	11-15	15-26	48-56	24-32
	POT	21-27	40-58	19-31	4-15	34-47	41-59
	RKV	20-21	33-35	12-14	18-22	50-54	26-30
	RSN	21-27	40-58	19-31	4-15	34-47	41-59
	SPR	19-21	33-37	13-16	28-34	39-43	26-30
	SPY	22-26	37-41	14-17	17-23	46-51	30-34
	SRC	19-21	28-31	8-10	17-30	51-62	18-22

Table 11. 90 percent Confidence Intervals for Selected Chemical Properties

STRAT. LEVEL SOIL UNIT	SOIL LEVEL SOIL SERIES	A HORIZON pH	C HORIZON pH	ORGANIC CARBON	C HORIZON CARBONATE	Ahe OR (Ae) THICKNESS	LFH THICKNESS
ADY 1		7.1-7.2	7.8-7.9	4.0-4.6	23-25	-	-
ATL 1		6.2-6.5	7.5.7.6	5.5-6.3	17-20	-	-
DEL 1		5.4-5.7	7.7-7.8	4.2-4.8	13-16	-	-
DVG 1		5.6-5.9	7.4-7.6	6.4-7.1	14-17	0-24	-
ELB 2		5.5-5.9	7.2-7.5	4.1-10.0	9-17	(7-12)	6-12
FSH 1		5.8-6.1	7.6-7.7	6.8-7.8	15-19	-	-
FSH 2		6.4-6.7	7.7-7.9	8.0-10.3	24-31	-	-
FSH 3		5.8-6.3	7.6-7.8	7.1-9.3	12-18	-	-
LLK 1		7.1-7.2	7.8-7.9	5.7-6.2	25-29	-	-
LTC 1		5.2-5.6	7.4-7.5	4.6-6.5	10-15	4-6 (8-11)	4-6
RSN 1		5.3-5.7	7.1-7.5	3.6-4.8	8-14	7-13(10-13)	5-7
SPR 1		4.9-5.2	5.9-6.4	1.7-2.5	1-2	(14-18)	4-5
SPY 1		5.8-6.3	7.4-7.6	7.7-9.8	13-19	-	-
SRC 1		5.9-6.5	7.1-7.4	6.1-8.4	5-9	-	-
SRC 2		6.5-7.0	7.4-7.5	6.2-10.1	8-12	-	-
	ADY	6.5-7.1	7.7-7.9	3.7-5.1	18-23	-	-
	ATL	6.1-6.4	7.5-7.6	5.6-6.4	17-20	-	-
	BPW	7.1-7.3	7.8-8.0	5.2-6.0	24-32	-	-
	DEL	5.3-5.6	7.7-7.8	4.3-5.0	12-13	-	-
	DVG	5.5-5.9	7.5-7.6	6.5-7.4	14-17	-	-
	EBO	6.0-8.1	7.6-8.1	4.5-5.2	16-40	-	-
	ELB	5.1-5.3	7.2-7.7	1.4-4.2	9-26	(6-13)	4-5
	FSH	5.9-6.2	7.6-7.7	7.2-8.1	16-20	-	-
	LLK	7.0-7.2	7.7-7.8	5.4-6.0	23-29	-	-
	LTC	4.5-5.1	7.4-7.5	1.5-3.6	7-15	2-3 (10-14)	5-8
	POT	6.1-6.7	7.2-7.7	6.7-12.4	11-22	-	-
	RKV	6.2-6.8	7.7-7.9	4.0-4.5	21-25	-	-
	RSN	4.9-5.2	6.3-7.5	1.3-3.0	2-12	(9-18)	3-5
	SPR	4.8-5.1	5.9-6.5	1.1-1.7	1-3	(16-20)	4-5
	SPY	5.8-6.3	7.4-7.6	7.7-9.8	13-19	-	-
	SRC	5.4-6.1	6.8-7.4	5.3-6.3	2-5	-	-

carbon in the A horizon (3.7 to 5.1%), and C horizon carbonate (23 to 25%).

The capacity to quantify these parameters at a stated level of confidence (90%) considerably enhances their usefulness as indicators of both the expected values of given properties in given units or series and the anticipated variability of those properties. Tables of confidence intervals and coefficients of variability of selected soil properties for all major soils and soil units would undoubtedly be valuable additions to any soil survey report. They would provide users accustomed to working to specified tolerances with the requisite data to determine those tolerances.

Use of CI's and CV's to Examine the Validity of Class Separations

An examination of both the absolute magnitude, as expressed by the confidence intervals (CI's) and the relative variability, as indicated by the coefficients of variability (CV's) of the measured properties provided certain insights into the factors which effectively discriminated between the various arbitrarily defined soil unit and Soil Series classes. An initial inspection of the confidence interval data (Tables 9 through 11) revealed that not all properties were equally effective in justifying group separations and not all groups were separated on the basis of dissimilarity of the same properties. Similarly, a review of the coefficient of variability data (Tables 12

through 14) revealed that not all properties were equally variable nor were all units or series equally variable either with respect to individual properties or relative to the overall class average 'variability index'. These observations may be recognized by some as self evident, but all too frequently, the producers of soil survey information have failed to convey to the users of this information the 'obvious' facts that not all units were equally variable nor were all property estimates equally dependable. Consequently, users tended to accept soil maps as equally reliable with regard to all defined units and all interpretations, regardless of the variability of the properties upon which the interpretations or unit separations were based. For this study, a separate evaluation of each variable was considered desirable in order to ascertain the contributions of each examined variable to effective group separation and the relative variabilities of individual properties and units.

Ah Thickness (including Ahe, Ae, and LFH thickness)

Ah thickness was not universally useful as a criteria for group separation but did contribute to effective separation of some groups. For example, Fish Creek and Lloyd Lake Series were noted to have significantly thicker Ah horizons than Academy or Spy Hill Series. Similarly, soil unit SPY 1 appeared to have a significantly thinner Ah horizon than the similarly classified DVG 1 unit. The similarity of Ah thickness in

Table 12. Coefficients of Variability for Selected Morphological Properties

STRAT. SOIL UNIT	LEVEL SOIL SERIES	Ah(Ahe) THICK-NESS	B THICK-NESS	LIME DEPTH	2ND PM DEPTH	COARSE FRAGMENTS	% SLOPE
ADY 1		75	48	50	25	84	41
ATL 1		38	38	35	-	46	50
DEL 1		35	33	35	19	58	50
DVG 1		28	45	32	23	55	45
ELB 1		41	37	26	17	90	78
FSH 1		31	36	27	17	43	67
FSH 2		34	58	64	22	114	51
FSH 3		36	31	27	26	127	36
LLK 1		44	51	52	-	59	67
LTC 1		76	37	28	19	35	57
RSN 1		96	29	23	28	115	70
SPR 1		-	57	34	33	80	53
SPY 1		62	46	41	32	80	84
SRC 1		40	55	42	16	50	45
SRC 2		49	60	64	29	101	40
AVERAGE		49	44	37	24	76	56
	ADY	38	44	36	-	62	39
	ATL	38	38	32	-	42	57
	BPW	32	37	31	-	-	64
	DEL	22	35	26	-	47	44
	DVG	35	36	26	-	94	67
	EBO	11	-	4	17	47	23
	ELB	(109)	20	31	38	-	88
	FSH	32	42	26	-	70	63
	LLK	31	38	30	-	69	48
	LTC	-	20	19	-	28	68
	POT	39	46	55	16	100	79
	RKV	27	37	28	22	56	26
	RSN	-	24	12	-	32	77
	SPR	-	49	21	-	42	52
	SPY	27	42	32	-	82	64
	SRC	31	55	53	-	47	42
AVERAGE		30	38	30	23	58	56

Table 13. Coefficients of Variability for Selected Physical Properties

STRAT. SOIL UNIT	LEVEL SOIL SERIES	PLASTIC LIMIT	LIQUID LIMIT	PLASTICITY INDEX	% SAND	% SILT	% CLAY
ADY 1		13	13	21	37	11	22
ATL 1		12	13	22	36	8	21
DEL 1		18	18	17	33	20	17
DVG 1		15	19	28	61	19	13
ELB 2		15	23	32	81	26	23
FSH 1		12	16	24	49	28	20
FSH 2		16	15	23	67	20	20
FSH 3		12	15	25	55	29	23
LLK 1		11	17	33	66	11	27
LTC 1		25	22	25	46	16	25
RSN 1		15	22	33	66	19	30
SPR 1		24	36	52	49	22	47
SPY 1		23	14	26	51	15	27
SRC 1		19	23	44	57	27	40
SRC 2		19	20	38	36	18	40
AVERAGE		17	19	30	53	19	26
	ADY	14	13	20	27	10	18
	ATL	12	12	20	33	8	18
	BPW	14	16	26	58	10	24
	DEL	9	7	13	14	10	9
	DVG	17	20	26	61	16	33
	EBO	8	7	8	54	13	10
	ELB	13	23	34	42	23	24
	FSH	11	15	24	29	30	18
	LLK	8	20	35	74	14	34
	LTC	25	18	22	34	10	19
	POT	21	23	32	76	20	24
	RKV	10	11	22	38	11	21
	RSN	18	25	32	82	21	24
	SPR	8	13	22	20	12	17
	SPY	17	12	18	36	14	14
	SRC	10	12	22	54	20	21
AVERAGE		13	15	24	46	15	21

Table 14. Coefficients of Variability for Selected Chemical Properties

UNIT OR SERIES	A HORIZON pH	C HORIZON pH	ORGANIC CARBON	C HORIZON CARBONATE	Ahe OR (Ae) THICKNESS	LFH THICKNESS	AVE CV
ADY 1	3	3	26	23	-	-	26
ATL 1	8	2	22	28	-	-	21
DEL 1	8	2	24	43	33	-	23
DVG 1	7	4	18	34	(85)	-	25
ELB 2	8	6	100	83	39 (37)	70	39
FSH 1	11	3	29	52	80	-	26
FSH 2	10	3	42	40	(30)	68	32
FSH 3	11	3	12	43	38 (45)	-	25
LLK 1	3	2	14	27	-	-	23
LTC 1	12	3	60	62	50 (40)	55	34
RSN 1	12	6	43	78	71 (38)	45	32
SPR 1	9	13	67	192	158 (43)	49	40
SPY 1	10	3	30	43	-	-	30
SRC 1	13	7	43	82	57	-	38
SRC 2	10	2	77	61	25	-	38
AVERAGE	9	4	40	59	61 (46)	57	30
ADY	10	2	34	25	-	-	22
ATL	7	2	21	27	-	-	21
BPW	3	2	13	26	-	-	23
DEL	8	2	24	25	-	-	16
DVG	9	1	17	26	47	52	25
EBO	13	2	6	36	-	-	14
ELB	2	4	61	59	109 (46)	13	34
FSH	10	3	26	50	16 (95)	35	24
LLK	2	2	13	25	-	-	25
LTC	7	2	60	49	38 (28)	28	25
POT	11	8	73	90	-	70	40
RKV	14	2	23	27	-	-	21
RSN	3	11	41	100	39 (46)	41	33
SPR	7	11	47	174	41 (34)	35	22
SPY	10	3	31	44	-	-	23
SRC	11	8	17	72	57	-	30
AVERAGE	8	4	32	53	50 (50)	39	25

the units ATL 1 and ADY 1 suggested that some other property or properties were responsible for defining the uniqueness of these groups. However, examination of the Ah horizon thickness coefficients of variability for these two units revealed that ADY 1 was much more variable with respect to Ah thickness than was ATL 1. Consequently, the separation may have been valid based on variability of Ah thickness rather than absolute value. The actual confidence intervals for Ahe, Ae and LFH thickness were less diagnostic for unit separation. The presence or absence of one of these horizons was of greater significance than their actual thickness.

B Horizon Thickness

Thickness of the B horizon appeared to be a valid indicator of group differences. The B horizon thickness definitely varied according to the geographic location of the soil units and the associated climate and vegetation. Thus, when arranged in order of increasing B horizon thickness, the soil units ADY 1 (20 to 26 cm), SPY 1 (22 to 30), ATL 1 (26 to 33), FSH 1 (28 to 33), DVG 1 (32 to 44), ELB 2 (37 to 50), SPR 1 (35 to 51), RSN 1 (43 to 52) and LTC 1 (47 to 50) reflected a change in geographic location from east to west in the study area, and a change in environment from dry grassland to subhumid forest. Additionally, high variabilities of B horizon thickness recognized for the units FSH 2 (58%), LLK 1 (51%), SPR 1 (57%), SRC 1 (55%) and SRC 2 (60%)

were considered to be diagnostic of these units. For example, B horizon thickness was considerably more variable in unit FSH 2 (58%) than in unit FSH 1 (36%) indicating that, at least with respect to this property, the two units differed in their variability. This observation supported the initial description of FSH 2 as a more variable unit than FSH 1.

Lime Depth

This measurement covaries strongly with the above discussed B thickness. Consequently, the same trends were observed and similar comments apply as detailed above. In addition, lime depth appeared to be an indicator variable in distinguishing between Academy Series (31 to 43 cm) and Rockyview Series (41 to 49 cm) or Antler Series (44 to 53 cm). Again, relative variability was noted to be as important a criteria for group separation as absolute magnitude. Lime depth was considerably more variable in ADY 1 unit (50%) than in the geographically associated ATL unit (35%). Similarly, FSH 2 (64%) was again observed to be more variable than FSH 1 (27%).

Second Parent Material Depth

This variable was only valid in map units in which underlying parent materials were recognized. Consequently, it was of limited use as a universal discrimination variable. Where second parent materials were noted, the presence of the second material was

often sufficiently diagnostic that the actual depth or variability in depth was of little consequence for group separation.

Coarse Fragment Content of the C-horizon

Coarse fragment content estimates were noted to have high coefficients of variability for almost all units and series. This applied equally to units with relatively high coarse fragment proportions, and to units with low percentages of coarse fragments where high CV's reflected little significant change in stone content. Consequently, this variable was not suitable for distinguishing between units with closely similar coarse fragment contents. However, three levels of stoniness were apparent in the data. They are <5%, 5 to 15%, and 15 to 30%. Where otherwise similar units displayed different levels of coarse fragment contents, this variable proved effective in separating the groups. For example, ADY 1 was similar in many respects to ATL 1 but appeared to have a significantly different mean coarse fragment content (2 to 4% vs 9 to 11%). Similarly RSN 1 (3 to 9%) could generally be distinguished from LTC 1 (9 to 11%) from SPR 1 (16 to 26%) on the basis of coarse fragment content.

Percent Slope

Most of the units evaluated were defined to occur on 0 to 9 percent slopes. Therefore, this variable was not an effective group separator for most units. A few

units obviously occurred on steeper slopes; LTC (13 to 19%), SPR (23 to 31%) and SPY (7 to 13%) and these were immediately distinguishable from surrounding more level areas without the requirement for data analysis.

Atterberg Limits (WL, WP, IP)

The plastic and liquid limit determinations had reasonably low CV's for most units and surprisingly narrow confidence intervals. The plasticity index (IP) was somewhat more variable as it incorporated the variabilities due to both plastic limit and liquid limit determinations. These variables were not highly useful for separating units which occurred on the same parent material but appeared to provide an effective means of separating units occurring on different materials. Some distinctions were obvious, as between the glaciolacustrine units such as FSH 1 (IP=24 to 27%) or ELB 2 (IP=23 to 29%) and the till units (ATL 1 (IP=13 to 15%) or SPY 1 (IP=13 to 16%). Other separations were less obvious from field observations and the quantitative evidence of valid group separations was appreciated. For example LLK 1 unit was believed to form on a somewhat different glaciolacustrine parent material than FSH 1 unit. Their respective plasticity characteristics LLK 1 (IP=13 to 15%) and FSH 1 (IP=24 to 27%); would appear to support this separation. T-tests could have been run to determine the statistical validity of this, and similar, conclusions, but were

considered unnecessary when comparisons dealt with widely separated, non-overlapping, 90 percent confidence interval values.

Particle Size Separates (Sand, Silt, Clay)

Textural differences are one of the principal criteria for recognizing and separating soil units when mapping. Consequently, all soil units occurring on different parent materials were anticipated to display differences in particle size proportions. Gross differences in particle size distribution were immediately apparent among units and series established on different parent material classes. For example, glaciolacustrine soil units ELB 2, FSH 1 to 3, and LLK 1 all had significantly lower sand contents than the corresponding till units ADY 1, ATL 1, DEL 1, LTC 1, SPR 1 or SPY 1. All but LLK 1 had much higher clay contents than the till units. Two units, DVG 1 and RSN 1, which had been defined as being predominantly till were noted to have particle size distributions intermediate in composition between the glaciolacustrine and the till units. This observation applied to the individual Series recognized as Dunvargan and Robinson as well as to their respective units. It was therefore apparent, that the differences in overall textural composition of the units were due not only to inclusions of glaciolacustrine soils but also to a fundamental difference in the particle size distribution of the till recognized in

these units (DVG, RSN) compared to all of the other tills. The third parent material group tested included the fluvial soils recognized in SRC 1 and SRC 2 soil units. These units displayed the highest confidence interval values for sand content and the lowest for clay content of all the units investigated. Despite the high variability of SRC 1 and SRC 2 with respect to textural composition, it was apparent that a valid and effective textural separation of these units from all others had been made.

Perhaps more interesting than the verification of the effectiveness of gross parent material separations was the information conveyed about more subtle differences between relatively similar soil units. For example, among the till units ADY 1, ATL 1, DEL 1, LTC 1, SPR 1 and SPY 1, three distinctly different groupings were evident. DEL 1 differed from all other till units with respect to its high sand content (28 to 33%) and relatively low silt content (39 to 43%). Similarly, ATL 1 unit differed from all the other units with respect to its high silt content (50 to 52%) and relatively low sand content (15 to 18%). The third group contained the soil units ADY 1, LTC 1, SPR 1, and SPY 1. All but ADY 1 had originally been recognized to occur on the same, western origin, cordilleran till; and to differ from one another with respect to other attributes such as Subgroup classification, Ah thickness or surface pH. The

inclusion of ADY 1 unit in this group could not be explained in terms of the postulated geologic history of the area and suggested a potential need for more detailed examination of this anomoly. Nonetheless, ADY 1 unit was recognized to differ in texture from the adjacent ATL 1 and DEL 1 units. This observation was significant in light of some initial mapping uncertainty regarding the validity of the separations made among ATL 1, ADY 1 and DEL 1 units.

Similar indications of minor, but still significant, differences in particle size distribution characteristics were evident among the soil units established on glaciolacustrine parent materials. The units ELB 2, FSH 1, FSH 2 and FSH 3 were all viewed as occurring on the same parent material. With the exception of FSH 2 they all displayed nearly identical confidence interval values for sand, silt and clay percentages. FSH 2 unit had a somewhat higher silt content and lower clay content than the remaining units. This was most likely due to the recognized inclusions of somewhat lower clay content recent lacustrine parent materials in FSH 2 areas. LLK 1 unit was observed to have a recognizably different particle size distribution than any of the other glaciolacustrine units. It had a significantly lower clay content (29 to 34%) and a much higher content of silt (56 to 60%) and sand (9 to 12%) than the abovementioned glaciolacustrine units. These

differences had been noted during initial mapping and it was hoped that they would be substantiated by transect sampling. Demonstration of this textural difference supported the initial field separation of these units.

Within the alluvial units SRC 1 and SRC 2, it was expected that SRC 2 would have a somewhat different and certainly more variable texture than SRC 1. This difference was not substantiated by the particle size distribution data. Both units had comparable values and variabilities of sand, silt and clay. Thus, while the two units had demonstratively different taxonomic classification components, and drainage conditions, the parent material textural characteristics appeared to remain essentially constant. This was a somewhat unexpected, but certainly useful, finding.

pH (A and C horizons)

Confidence interval values for surface and subsurface (parent material) pH were uneven in their usefulness as discriminators of recognized soil groups. C horizon pH in particular was similar for a large number of the investigated units. Only SPR 1 had a markedly different C horizon pH and it was suspected that this resulted more from sampling irregularities than from true differences. Many of the soils in SPR 1 unit had exceedingly hard, compact and stony subsurface horizons which made extraction of C horizon samples very difficult. Numerous samples were taken at or near the

top of the C horizon and may not have been truly representative.

Some interesting relationships were noted upon examination of the A horizon pH confidence interval values. The three major till units mapped in the eastern and central portions of the study area, ADY 1, ATL 1 and DEL 1, had demonstratively different surface pH's. ADY 1 was neutral (7.1 to 7.2), ATL 1 was slightly acid (6.2 to 6.5), and DEL 1 was strongly to medium acid (5.4 to 5.7). It was evident that an effective separation of these three units based on surface pH had been achieved. The low surface pH noted for DEL 1 unit was unexpected and was thought to be attributable, in part, to the acidifying effect of chemical fertilizer use. The relatively high surface pH observed for ADY 1 unit was considered to be consistent with the shallow depth to lime and highly calcareous parent material which had been used as field differentia for this unit.

The soil units which had been mapped under forest were observed to possess more acidic surface horizons than grassland soils mapped on similar parent materials. Thus, ELB 2 (5.5 to 5.9), LTC 1, (5.2 to 5.6), RSN 1 (5.3 to 5.7) and SPR 1 (4.9 to 5.2) all had very strongly to medium acid surface horizons which contrasted with the slightly acid to neutral pH's of most of the other soil units. Among these forested units, SPR 1 was observed to have a markedly lower

average pH (4.9 to 5.2) than the other three (5.2 to 5.9). If surface pH is taken as indicative of the degree of eluviation, then this data can be interpreted as supporting the classification of Spruce Ridge soil as an Orthic Gray Luvisol and the dominant soils in the units ELB 2, LTC 1 and RSN 1 as Dark Gray Luvisols.

Among the glaciolacustrine units, LLK 1 (7.1 to 7.2) was readily distinguished from FSH 1 to FSH 3 (5.8 to 6.7) by surface pH. LLK 1 was described during initial mapping as being more strongly calcareous than the FSH units. Consequently, the analytical data fully supported the initial field assessments. Within the FSH units FSH 2 (6.4 to 6.7) was noted to differ somewhat from FSH 1 and 3 (5.8 to 6.3). This difference may have been partly due to the higher water table characteristic of FSH 2 unit and the accompanying tendency for shallower depths to and higher concentrations of calcium carbonate. The medium to slight acidity (5.8 to 6.5) noted for most FSH 1 to FSH 3 areas was entirely consistent with a postulated weak eluviation of these units which was anticipated due to their location in areas affected by shifting tree cover and a subhumid climate.

Organic Carbon of the Surface Horizon

The confidence interval values for the organic carbon of the surface horizon did not effectively separate all of the defined groups but they did suggest

patterns followed by the units. When the Chernozemic soil units were arranged in order of increasing mean organic carbon content, the following sequence resulted: ADY 1 (4.0 to 4.6, DEL 1 (4.2 to 4.8), ATL 1 (5.5 to 6.3), LLK 1 (5.7 to 6.2), DVG 1 (6.4 to 7.1), FSH 1 (6.8 to 7.8), FSH 3 (7.1 to 9.3), SPY (7.7 to 9.8) and FSH 2 (8.0 to 10.3). This order clearly indicated an increase in organic matter content in the surface horizons of these units which was related to their geographic locations. The further west the unit was mapped, the higher was its content of organic carbon. This was interpreted principally to reflect the environmental controls operative in the genesis of these soils. The more westerly units developed under cooler, moister conditions which presumably favored lusher vegetation, greater organic matter additions, and slower removal. In addition, the more easterly units were subject to much more intensive cultivation which may have contributed to accelerated organic matter decomposition.

Examination of the Luvisolic (forested) soil units revealed a similar but inverse pattern. The order LTC 1 (4.6 to 6.5), ELB 2 (4.1 to 10.0), RSN 1 (3.6 to 4.8) and SPR 1 (1.7 to 2.5) revealed a decrease in surface organic carbon content in a westerly direction. The more westerly units (e.g. SPR 1) were under more continuous forest cover and were more strongly leached than their eastern counterparts (i.e LTC 1). It was noted that the

Dark Gray Luvisolic units LTC 1, ELB 2 and RSN 1 were not effectively differentiated from one another or from their Chernozemic counterparts (ATL 1, FSH 1, DVG 1) by their surface organic carbon CI's. Other properties (e.g. pH) were more effective in making these separations. However, the variability in organic carbon content as expressed by C.V. was observed to be considerably greater among the Luvisolic units than among the Chernozemic ones. Consequently, the degree of surface horizon variability was regarded as contributing to the differentiation of these units.

C Horizon Carbonate

Carbonate content of the C horizon was effective in differentiating between some otherwise similar groups. It differed considerably among the three spatially associated till units; ADY 1 (23 to 25%), ATL 1 (17 to 20%), and DEL 1 (13 to 16%) thereby further confirming previously noted differences among these units. Within the glaciolacustrine soil units, the C horizon carbonate values differentiated between FSH 2 (24 to 31%) and FSH 1 and FSH 3 units (12 to 19%). Similarly LLK 1 (25 to 29%) was distinguishable from FSH 1 or FSH 2 (12 to 19%) but not from FSH 2 on this basis. The high carbonate content units appeared to be associated with high silt contents (FSH 2, LLK 1) or high water table levels (FSH 2).

The forested units ELB 2, LTC 1 and RSN 1 all had comparable carbonate content confidence levels (8 to 17%) which were generally lower than the grassland soils on similar parent materials (e.g. ATL 1, 17 to 20%). DVG 1 (14 to 17%) and SPY 1 (13 to 19%) which were mapped in a forest-grassland transition environment had carbonate contents intermediate between the grassland (Chernozemic) and the forested (Luvisolic) soils. SPR 1 had a very low mean carbonate content which has previously been discussed as attributable to sampling error.

The alluvial units SRC 1 (5 to 9%) and SRC 2 (8 to 12%) had lower carbonate contents than most of the other till or glaciolacustrine units. The low absolute value for carbonate content confidence intervals in SRC 1 and 2 units was unexpected in view of the fact that so many of the soils in these units were calcareous to the surface or gave other indications of carbonate accumulation.

Relative Variability as Indicated by C.V.

An examination of the coefficients of variability computed for each property, for each unit and series was conducted in order to document the initial observation that not all units or properties were equally variable. An average C.V. was computed for each property for the sum of all map units or Soil Series. The average value was used to compare the relative variabilities of individual properties

irrespective of unit or series stratifications. It was also used to examine the relationship between the variability of soil units and their respective naming series. Finally, an 'index of variability' was computed for each unit and series as the mean of the individual C.V.'s for each investigated property. It was used as a measure of the overall relative variability of each tested soil unit or series.

The most apparent relationship was that the various properties did indeed display different degrees of variability. The evaluated properties were arranged in order of increasing C.V. and assigned a relative variability rating. This rating grouped the properties into four classes defined as low (C.V. <15%), moderate (C.V.=15 to 29%), high (C.V.=30 to 50%) and very high (C.V. >50%). The resultant classes and the C.V. values computed for each property were then compared to classes and C.V. values proposed by Beckett and Webster (1971) and Wilding and Drees (1978) (Table 15). The observed correspondence was very good although the rating schemes produced different class rankings by using different class boundary values. Agreement between the C.V.'s determined for this study and those reported in the literature was remarkably close for all but a few properties. Ah horizon thickness, percent sand, and C horizon carbonate were much more variable as determined by this study than had previously been reported. No obvious explanations for these deviations were apparent. The class ratings of variability produced by this study agree best

Table 15. Comparison of Relative Variabilities noted in this study with Previously Reported Values

RELATIVE RATING	PROPERTY OR MEASUREMENT	THIS STUDY CV	THIS STUDY RANK	BECKETT & WEBSTER CV	BECKETT & WEBSTER RANK	WILDING & DREES CV	WILDING & DREES RANK
Low (<15)	pH of C horizon	4	1	14	1	11	1
	pH of A horizon	9	1	12	1	11	1
Mod (15-29)	Liquid Limit	17	2	15	1	15-35	2
	Plastic Limit	19	2	16	1	15-35	2
	% Silt	19	2	27	1	21	2
	2nd Parent Material Depth	24	2	-	-	-	-
	% Clay	26	2	27	1	24	2
High (30-50)	Plasticity Index	30	3	35	2	> 35	3
	Lime Depth	37	3	35	2	35	3
	A horizon Organic Carbon	40	3	35	2	39	3
	B horizon Thickness	44	3	43	2	> 35	3
	Ae horizon Thickness	46	3	-	-	-	-
	Ah horizon Thickness	49	3	21	1	<15	1
Very High (> 50)	% Sand	53	4	21	1	28	2
	% Slope	56	4	-	-	-	-
	LFH horizon Thickness	57	4	-	-	-	-
	C horizon Carbonate	59	4	-	-	26	2
	Ahe horizon Thickness	61	4	-	-	-	-
	C horizon Coarse Fragments	76	4	-	-	-	-

with those advanced by Wilding and Drees (1978). Only the three previously mentioned properties were ranked at different levels by the two approaches. The very highly variable class defined by this study consisted mainly of morphological properties not evaluated by either Wilding and Drees or Beckett and Webster.

The relative class rankings were considered to be useful indicators of the confidence with which a given variable could be used to define group separations or to support particular land use interpretations for any given group. Thus, the values of properties rated as low or moderately variable could be confidently used to differentiate or interpret map units while those rated as highly variable were less useful. Interpretations or group separations based on highly or very highly variable properties were considered to be suspect unless the basis for the interpretation or separation was the observed high variability of the property, not its absolute value.

Several studies have detailed the greater variability of mapping units compared to their naming taxonomic series (Beckett and Webster 1971; Wilding and Drees 1978). A repetition of this exercise was therefore not necessary in this study. It was, however, noted that the C.V.'s determined for every property were lower for the taxonomic unit stratification level (series) than for the mapping unit level (soil units)(Tables 12 to 14). The average coefficient of variability computed for all variables and

all classes of 30% for soil units and 25% for Soil Series aptly illustrated this greater variability of map units versus series.

An average C.V. was computed for each unit and series based on the mean of the individual C.V. values for each examined variable in that unit or series. This average C.V. was thought of as a 'variability index' and was used to compare the relative variabilities of the various tested units and series. The 'variability index' for soil units ranged from 21 to 40 and had a mean value of 30. Consequently, units with values less than 30% were regarded as least variable and those with values greater than 30 were taken to be most variable. Using this arbitrary classification, the least variable units overall were ATL 1 (21%), DEL 1 (23%), LLK 1 (23%), DVG 1 (25%), FSH 3 (25%), FSH 1 (26%), ADY 1 (26%), and SPY 1 (30%). The most variable units were FSH 2 (32%), RSN 1 (32%), LTC 1 (34%), SRC 1 (38%), SRC 2 (38%), ELB 2 (39%) and SPR 1 (40%). Of the least variable units only DVG 1 had been found to have poor predictive capacity with regard to its taxonomic composition. Thus, while the taxonomic classification had been inaccurately specified for this unit, a relatively low property variability had been attained. A refined description would have resulted in a more useful map unit. The most variable units had all been previously identified as poorly mapped and described or as inherently variable. Consequently the variability index merely confirmed

previously noted trends. Since these units occurred either under forest or on fluvial landscapes, it was concluded that these environments promoted high variability and inhibited accurate separation and description of uniform units.

With regard to the fluvial units SRC 1 and SRC 2 it was noted that most of the variability arose from morphological property changes and that the engineering and physical properties of the parent material had relatively low C.V.'s. Additionally, SRC 2 was again demonstrated to be no more variable than SRC 1 with respect to the evaluated properties.

E. Analysis of Variance Approach

The visual inspection of confidence intervals and coefficients of variability conducted in the previous section facilitated the identification of a few properties which were appropriate for input into an analysis of variance (MIDAS: ANOVA command). The variables selected were those which were noted to have non-overlapping confidence intervals for a maximum number of units and additionally had low unit variabilities and more or less similar within group variabilities as indicated by C.V. The chosen properties were A horizon pH, liquid limit, plasticity index, percent silt, percent clay, depth to lime and B horizon thickness. The analysis of variance results for these variables are summarized in Table 16. Statistically significant soil unit groupings were indicated for all analyzed variables. The

Table 16. Skeleton Analysis of Variance Table for Selected Soil Properties

VARIABLE	SOURCE OF VARIATION	SUMS OF SQUARES	df	MEAN SQUARES	F STATISTIC
pHA	between units	193	14	14	47*
	within units	137	471	0.29	
	TOTAL	330	485		
Liquid Limit	between units	18,259	14	1304	23*
	within units	25,929	462	56	
	TOTAL	44,188	476		
Plasticity Index	between units	10,627	14	759	30*
	within untis	11,686	459	25.5	
	TOTAL	22,313	473		
Percent Silt	between units	14,720	14	1051	16*
	within units	30,791	463	66.5	
	TOTAL	45,510	477		
Percent Clay	between units	66,891	14	4778	52*
	within units	42,873	463	93	
	TOTAL	109,760	477		
B horizon Thickness	between units	43,003	14	3072	13*
	within units	99,467	413	241	
	TOTAL	142,760	427		
Lime Depth	between units	55,542	14	3967	10*
	within units	160,760	414	388	
	TOTAL	216,300	428		

* The Computed F Statistic is significant at the 1% level. (i.e. not all the means in the defined groups come from the same population, so at least one group differs from all the others).

magnitude of the F-ratio was taken as indicative of the relative effectiveness of a given property for group differentiation. Accepting this assumption, the two best discriminating properties were percent clay (F=52) and A horizon pH (F=47).

F. Discussion of the Random Transect Technique

In the course of data collection and analysis for this study, the random transect technique was found to offer numerous benefits and to generate only a few problems. The benefits were derived mainly from two sources; a practical ease of operation and a simple conceptual framework. The problems included confusion regarding the intended uses of the collected information and a tendency to attempt to use one data set for two opposing purposes; namely to both describe a set of preselected groupings and to evaluate the mapping accuracy with respect to the groups so described. Additionally, in some cases, having open-ended classifications resulted in either the production of too many class values (Series) for a given soil unit, or too many unclassified sites to allow for meaningful analysis.

Considering first the advantages; the transect method proved to be simple to plan and to execute in the field. The selection of transects to be investigated was easily accomplished by means of a computer program which chose 10 random numbers between 0 and n (the total number of available transects). For someone who was conditioned to

carefully exercising a bias in the selection of sample points, it was a somewhat unnerving experience to allow sample site selection to be performed by random draw. However in order to maintain statistical rigour, every transect and every point along each transect had, at least initially, to have an equal chance of being sampled. Location of the selected delineation in the field was never a problem, although sometimes access was. In addition, it was almost always possible to positively locate at least one point along a selected transect once in the field. With one point located, it was a simple procedure to determine the required bearing for the transect and to procede along that bearing taking samples at the predetermined fixed interval. One of the subjective conclusions of this study was that transects with few observations (<7) were less useful (too variable) while those with large numbers of observations (>12) were often redundant. Initial location of transects within delineations was arranged so that most were of a similar length which produced about 8 to 12 observations per transect. Adjustment of sampling intervals for each transect to obtain the desired 8 to 12 samples was not recommended since it would produce samples representative of different sized areas and separated by different distances. These conditions confound subsequent data analysis as a result of problems arising from autocorrelation of soil characteristics and non-equality of sample areas.

Once a starting point had been located in the field, and the appropriate bearing taken, the location of the actual sample points was determined in a truly unbiased fashion. The discipline enforced by rigid adherence to the fixed sampling interval was in itself a benefit. Where the intent of sampling is to draw an unbiased sample, the sample collector must be allowed a minimum amount of influence in selecting any given sample site. It was felt that the method adopted for site location satisfied this criteria better than other proposed approaches. The location of a single sample point, randomly chosen according to grid coordinates on a map, is not only extremely difficult in the field, it is also subject to considerable selection bias since the translation of the point from the map to the field involves locational errors of several tens of metres at best at 1:50,000 scale.

The sampling of consecutive points along a line within several individual delineations of a given map unit was also noted to have certain advantages over the alternative approach of randomly chosen point investigations within multiple, widely scattered, delineations of the same map unit. Most of the advantages were of a practical, rather than a theoretical nature, but are advanced as benefits nonetheless. It was noted that in the course of traversing the entire range of expressed features of a given delineation, the sample taker gained an appreciation of the compositional make-up and characteristics of that

delineation which complemented the information being recorded at the sample sites. There was an immediate capability at the end of any transect to assess the meaning of the observations just taken, and to relate the determined proportions back to the landscape which had just been crossed. This benefit had nothing to do with the randomness of the original transect selection procedure, but related only to the systematic site selection technique used along any given transect. Regardless, the immediate feedback was found to be helpful for both a relatively experienced mapper and virtually novice assistants. The assistants were able to record the required observations and to take the required samples with only a minimal amount of training. However, in the course of describing the individually located sites and having to record them within the context of a traversed landscape unit, they rapidly gained an appreciation of the relationship between landscape features and observed soils. Consequently, it was concluded that the transect technique not only provided an ideal opportunity to obtain valuable production from relatively inexperienced soil mappers, it also performed a very significant and beneficial training function for the individuals collecting the information. Another practical advantage concerned the savings in time and effort afforded by use of the transect technique. Once the initial sample site had been located, and the transect commenced, a significant number of subsequent sites were easily and rapidly located, comparisons or classifications

were facilitated by recent exposure to similar profiles, and a significant portion of the information to be collected had only to be recorded once since it applied to all sites within that transect (i.e. Map Unit name, transect location, etc.). The abovementioned advantages are considerably less evident in any technique which uses a random selection of points. Since only single points are visited within given delineations the capacity to assimilate and synthesize the information with respect to the investigated landform units while still in the field is considerably diminished. The soil/landscape relationship is not as strongly perceived and the factors controlling soil component variation within a landscape unit are not as immediately obvious as when a continuous landscape traverse is used.

Transect sampling also offers a few theoretical advantages over random point sampling. For example, collection of multiple samples within several individual delineations affords the opportunity to evaluate the degree of soil property variability at the delineation level as well as at the map unit level. It is often advisable to assess the amount of variability between delineations as well as between map units. If it is greater between delineations of a given map unit than between map units then the effectiveness of the mapping is suspect. This capacity is non-existent unless multiple replications have been obtained from several delineations of each studied map unit. If these are to be taken they may as well be obtained by

random transect. Extensive, single site, sampling may therefore become unnecessary and prohibitively expensive.

Another benefit of transect style data collection relates to the problem of non-normal distribution of some soil properties. Many statistical analysis techniques assume a normal population distribution and are not applicable to non-normal distributions. Data manipulation can be attempted in order to massage skewed data into a normal distribution but a simpler expedient may be used for some soils investigations. It has been established that even when a population of individual observations has a non-normal distribution, the distribution of sample means for several sample populations drawn from the total population has a tendency to be normal. Hence, non-normally distributed soil properties may be averaged for each transect of a given map unit, and the resulting distribution of n-sample means for the n-transects run for that map unit may be treated as normally distributed for subsequent data analysis.

The above discussed benefits may be thought of as general or non-specific advantages of the transect technique. Certain other advantages are directly related to the solution of ongoing soil survey problems. The overwhelming impression gained by the author is that the transect technique is a highly valuable tool for initial legend creation and map unit definition. The capability of producing statements which precisely define the proportions of component soils in a given unit at a stated level of

confidence early in a survey is most desirable. Several advantages are immediately apparent. The precise definition provides the surveyor with a feeling for and an understanding of the composition of his map units early in the survey which in turn permit him to consistently recognize similar delineations during ongoing mapping and to note if the composition of a defined map unit begins to change as he progresses into new geographical areas.

The transect technique may also be utilized as an effective ongoing mapping and correlation tool. The capability to produce statistically controlled estimates of modal values for Soil Series and soil unit properties based on non-biased sample selections allows for the generation of unambiguous descriptions of these conceptual classes. Subsequent mapping projects in the same or adjacent areas benefit from the presence of precise, unambiguous descriptions of the characteristics of specific Soil Series or soil units. In this study, several soils were initially correlated with series mapped in adjacent areas by means of traditional field inspection methods. The quantitative assessment of soil properties for these series generated from the transect samples suggested that the series as mapped in the Calgary area differed in several respects from the traditional concepts of those series in other areas. However since no objective assessment of these series properties had previously been conducted it was not possible to reject the hypothesis that the correlated series were in

fact similar and that the original, undocumented concepts, were incorrect. The provision of accurate, quantified, values for certain critical properties of the recognized Calgary area soil units is expected to considerably diminish this problem in the future.

A further benefit of the transect technique is that it allows for the production of accurate descriptions by means of transect techniques early in the survey. These permit a final mapping accuracy evaluation to be made using the same technique but a different sample selection. This second evaluation to determine mapping and description accuracy is considerably simplified if the initial descriptions were generated systematically and were expected to be accurate at the stated tolerance level.

The main problem related to the transect method encountered during this study concerned the abovementioned desire to quantify the overall accuracy of the mapping at the end of the survey. The contradictions involved with using the same data set to both define units and evaluate the accuracy of a given unit were not immediately apparent. Consideration of this problem led to the conclusion that two separate data sets must be collected in order to avoid this contradiction. The first should be used to define the confidence intervals for defined soil components and relevant soil properties. The second, separate, sample draw should be done near the close of the survey. The prime objective of this second sampling should be to produce a

second evaluation of both the soil unit compositions and the soil property confidence intervals which could be compared to the initial determinations. The comparison could take the form of a regression equation between the two sets of data or could involve computation of average differences between the paired values or calculation of the percentage of new mean values which fell within the original confidence intervals for the respective pairs. Regardless of the approach to data synthesis, a great benefit would be realized by having two sets of quantitative data, both obtained by the same standard procedure and both containing the same observations and variables.

One other minor problem which arose during analysis of the data was the preponderance of observation sites at which no series name was applicable or in a similar fashion the large number of only slightly different series which it was possible to recognize only once or twice within a given map unit. Frequently, except for dominant, subdominant and highly contrasting inclusions, the series name was of less concern than a site's degree of similarity to or difference from one of the principal component soils. To this end a four class system consisting of no, low, medium and high contrast soils was utilized in order to effect a more useful evaluation of the composition of some soil units. Since low contrast soils were expected to behave similarly to the naming series for almost all uses, it was sometimes desirable to group the naming and low contrast soils in

order to assess probable 'interpretation purity'. This objective could also be served by classifying similar soils as taxadjuncts of the nearest defined series and identifying them by means of the defined series three letter code and an appropriate taxadjunct modifier. This would allow all limits to be evaluated in terms of named series and associated taxadjuncts and would allow almost all sites to be assigned some series or series taxadjunct symbol.

V. SUMMARY AND CONCLUSIONS

A. Summary

In general, the various techniques of analysing the data obtained along the randomly selected transects of map units yielded consistent and interpretable results. The estimates of percent purity of the examined units with respect to various classifications clearly idicated that certain units had a high predictive capacity relative to the determined classes while others were less pure. It was possible to arrange the soil units in order of decreasing classification purity such that ATL 1, FSH 1, LLK 1, SPY 1, and DEL 1 were rated as having high purities; FSH 3, FSH 2, SPR 1, SRC 1, and DVG 1 and were recognized to be moderately pure and LTC 1, ADY 1, ELB 2, SRC 2 and RSN 1 were of low purity. Consideration of the units displaying low purity revealed that SRC 2 was defined and described as highly variable and was therefore expected to have low purity. The low purity rating for ADY 1 soil unit arose from the recognition of two separate series during sampling for what initially had been regarded as a single broadly defined series. When ADY 1 unit was defined as recognizing two principal component soils, Academy and Rockyview, the overall percent purity of this unit was revised to highly pure. The three remaining units LTC 1, ELB 2 and RSN 1 were found to differ considerably from their initial descriptions. ELB 2 and RSN 1 in particular were both poorly

mapped and poorly described.

Determination of the 90 percent confidence intervals for taxonomic composition of the studied map units resulted in the production of a more accurate appraisal of soil unit component proportions than had been possible by more traditional methods. Both the graphical method and the computer calculation of sample mean confidence limits yielded similar results. A comparison of the graphically computed confidence intervals and the original field estimates of map unit composition revealed which units had initially been well mapped and described and which had not. Frequently, the source of description inaccuracies could be identified and appropriate corrective measures suggested. The least accurately described units included SRC 2, ADY 1, ELB 2, LTC 1 and RSN 1. This evaluation supported the initial identification of these units as highly variable or poorly described.

Computation of 90% confidence limits for the mean values of selected morphological and analytical properties of the examined soils and soil units allowed for the generation of modal profile descriptions for all recognized series and map units. In addition, visual inspection of the tabulated data assisted in identifying which properties were most effective for differentiating between the established groups and which groups differed with respect to any given property or combination of properties. All units differed from all other units with respect to at least one

investigated property. The variables which effectively differentiated among the greatest number of defined soil units were percent clay, surface horizon pH, plasticity index, liquid limit, percent silt, B-horizon thickness and depth to lime.

An analysis of the relative variabilities of selected soil properties, and defined soil units, as indicated by coefficients of variability, revealed that not all properties or units were equally variable. The various soil properties recorded by this study were arranged in order of increasing C.V. and assigned a relative variability rating of low, moderate, high, or very high. (Table 13). The classes so defined agreed very well with those proposed by Wilding and Drees (1978). Ah horizon thickness, percent sand and C horizon carbonate were the only properties which demonstrated variabilities much different than previously reported in the literature. A variability index was computed as the average value of all the C.V.'s for every property in each soil unit or series group. This index was used to identify the relative variabilities of the examined soil units and to rank them accordingly. The units identified as being most variable by this technique were FSH 2, RSN 1, LTC 1, SRC 1, SRC 2, ELB 2 and SPR 1. Most of these same units were also evaluated as highly variable with respect to percent purity of field classifications or confidence level agreement with original component estimates. The most variable units were noted to occur either under forest or on

fluvial landscapes where variability was inherently high and difficult to effectively separate.

A subjective, semi-quantitative, assessment of the relative rankings of the various units was conducted with respect to their percent purity, degree of agreement between computed and estimated soil proportions, and overall variability as indicated by average C.V. for selected soil properties (Table 17). An average rank was then computed in which a low rank indicated that the unit displayed low variability and was likely well mapped and described. A high ranking implied that the unit was either highly variable or poorly mapped and described. The average ranking identified LTC 1, SRC 2, ELB 2, and RSN 1 as consistently, the most variable or the most poorly mapped and described units. It is believed that the average rank summarized quite accurately, the relative quality of the soil mapping and the original map unit descriptions with respect to any given unit.

Analysis of Variance techniques were used to investigate whether statistically significant differences existed among the various defined soil units with respect to seven of the most important soil properties studied. Highly significant F-ratios for all properties indicated that at least some of the defined soil units differed from all others with respect to a given property. They also supported the observation that the objective of subdividing the landscape into smaller, less variable components (soil

Table 17. Relative Ranking of Evaluated Soil Units with Respect to Variability and Mapping Accuracy

RELATIVE VARIABILITY		EVALUATION TECHNIQUE			AVERAGE RANK.
		Percent Purity Ranking	Component Confidence Interval Agreement	Variability Index (Average CV)	
Least Variable or Best Mapped and Described	1	ATL 1	ATL 1	ATL 1	ATL 1
	2	FSH 1	SPR 1	DEL 1	FSH 1
	3	LLK 1	SPN 1	LLK 1	LLK 1
	4	SPY 1	FSH 3	DVG 1	DEL 1
	5	DEL 1	FSH 1	FSH 3	SPY 1
	6	FSH 3	DVG 1	FSH 1	FSH 3
	7	FSH 2	FSH 2	ADY 1	SPR 1
	8	SPR 1	DEL 1	SPY 1	DVG 1
	9	SRC 1	LLK 1	FSH 2	FSH 2
	10	DVG 1	SRC 1	RSN 1	ADY 1
	11	LTC 1	SRC 2	LTC 1	SRC 1
	12	ADY 1	LTC 1	SRC 1	LTC 1
Most Variable or Most Poorly Mapped and Described	13	ELB 2	ELB 2	SRC 2	SRC 2
	14	SRC 2	ADY 1	ELB 2	ELB 2
	15	RSN 1	RSN 1	SPR 1	RSN 1

groups) had been at least partially met. Detailed analyses of which soil groups were significantly different with respect to any given variable were not carried out. However, a least significant difference was computed for each investigated property and included as part of the analysis of variance data presented in Appendix 4. For any given property, any two soil unit means which differ by more than the reported LSD may be considered to be significantly different.

B. Conclusions

Evaluation of the data collected for this study and of the results obtained fom analysis of this data permitted the following conclusions to be made.

1. Confidence Interval Determinations of the component composition of the evaluated soil units provided more accurate estimates of the series composition of these units than was possible by traditional methods.
2. Comparisons of the quantitative determinations and the original estimates revealed which units could be considered well mapped and described and which could not.
3. The overall accuracy of the Calgary area mapping was comparable to reported accuracies for similar maps at similar scales.
4. Calculation of the 90% Confidence Intervals of selected properties for each of the examined strata provided

improved documentation of the modal characteristics of these units. This improved documentation enhanced the usefulness of the mapping for both prospective users and for future mappers .

5. Not all of the investigated properties or units were equally variable. Forested and alluvial units tended to be the most highly variable. Morphological properties were on the whole more variable than physical properties.
6. Statistically significant differences existed among the various defined units with respect to all of the evaluated properties. Not all groups differed relative to any given property but no two units were similar in all respects.
7. The Random Transect Method offers considerable advantages as a standard soil survey procedure for unbiased soil sampling and map unit composition determination. It is recognized by soil mappers as an extension to current soil survey techniques. Since it is seen as enhancing; rather than supplanting; current practices, it is likely to be more readily accepted and easily understood by soil mappers than other techniques.

VI. RECOMMENDATIONS

Certain recommendations all called for on the basis of the information obtained by this study. These recommendations fall into three general categories; namely specific suggestions regarding the Calgary area soil units, general guidelines regarding future use of the method as outlined and tentative proposals for modifications or extensions to the method as used.

A. Calgary Area Soil Units

1. The poorly described units ATL 1, LTC 1, ELB 2 and RSN 1 should have their descriptions revised to be in better agreement with the determined composition.
2. The relative ratings of the soil units with respect to overall variability should be included in the report in order to alert potential users to the range of displayed variabilities and to assist them in identifying which units are highly variable or poorly described.
3. The relative variabilities of the examined soil properties should also be included in the eventual soils report in order to indicate to users that interpretations based partly on highly variable properties may be subject to considerable error.
4. The soil proportions determined for each of the evaluated soil units should replace the original field estimates of series composition for those units in the soil report descriptions.

5. Tables 9 through 11 should be included in the final soils report intact in order to provide users with the capability of determining the modal characteristics for any soil unit or Soil Series of interest to them.
6. A short note should be inserted into the final soils report detailing the efforts which were made in order to assess soil unit variability and mapping accuracy. This note should include a statement regarding the overall accuracy of the mapping .

B. Guidelines for Use of the Random Transect Method

1. The random transect method should be adopted for interim use and evaluation by the Alberta Soil Survey. It is only through practical everyday use that weaknesses will be exposed and improvements suggested.
2. Potential uses of the random transect method should include:
   a. Legend development and initial soil unit and soil property documentation
   b. Ongoing mapping and correlation
   c. Final evaluations of map unit description and mapping accuracy.
3. Consideration of the results obtained in 2 a) above should dictate the intensity of effort directed towards the mapping of any given soil unit. Highly variable or poorly predictive units should receive a greater density of ground truth observations and correlation transects

than highly predicitve units.

4. Examination of initial sample results should be used to determine the required number of values needed to calculate any soil property mean for any soil unit at a given limit of accuracy and confidence level. This would rationalize sample collection and analysis procedures and prevent unnecessary expenditures of field and laboratory effort.
5. In an average sized Alberta county of 40 townships it is suggested that it might be both feasible and profitable to conduct at least one transect for every two townships in which a given, major, map unit occurs. This would result in a maximum of 20 transects for each major map unit and a more likely amount of 10-12 since not all units occur in all townships. This translates to a time requirement of 5 to 10 days to fully document each of a possible, say, 20 map units. Spaced over a four year mapping project, this would require the expenditure of 25 to 50 days per year to acquire all the necessary information. This time is not entirely taken at the expense of normal field mapping since the increased confidence obtained by accurate descriptions and ongoing quantitative correlation would undoubtedly contribute to increased mapping efficiency.

C. **Potential Modifications to the Transect Method**

1. Simplification of the procedure for recording and randomly selecting delineations to be examined is desirable. A simple procedure would involve recording one number for each 80 acres of each delineation of a given map unit. No transects would be drawn on the photos until a particular delineation was actually selected by choosing randomly one of the numbers assigned to that delineation. The transect could then be located within the delineation as per the previously detailed instructions. This approach removes the requirement for physically locating all available transects on a map even though only a small proportion are ever chosen for sampling.
2. A reduction in the number of observations made and analyses done for each sampled site might be in order. The morphological and analytical properties identified as highly variable in this study might be omitted from future transect studies after having been confirmed as similarly variable in the new map area. The number of classification categories recorded could be reduced to series, contrast and first and second parent material without adversely affecting data analysis capabilities.
3. An attempt should be made to ascertain the relative magnitude of within pedon (< 3.5m) or 'error' variability in future transect studies. This would require replication of some observations within 7 metres

for at least some transects of each map unit. A problem not addressed by this study concerns the determination of the relative distribution of variability at the soil unit, delineation and site levels. This problem should undoubtedly be investigated in future studies.

4. The unbiased data set assembled by the random transect technique lends itself to more complex forms of statistical analysis than attempted by this study. It is recommended that future investigations examine the potential benefits of using more sophisticated statistical techniques including principal component analysis, discriminant analysis, cluster analysis, and canonical correlation.

5. The random transect technique is not the only method of obtaining unbiased samples of prestratified map units. It is suggested that a comparative study of the cost efficiency and accuracy of the principal competing method might be desirable. An evaluation of one or two map units by both the random point approach and the random transect method would be an interesting research project. Such an exercise would be expected to reveal the relative drawbacks and benefits of the two alternatives and should permit a more objective assessment of their relative merits than was possible here.

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APPENDIX 1

Sample Field and Lab Forms and Dictionary Documentation of Micro Data Management File

DICTIONARY DOCUMENTATION OF CALGARY TRANSECT DATA MANAGEMENT FILE (BM.TRANDAT)

FOR: BM.TRANDAT
DATA SET LOCATION: KTKO:BM.TRANDAT
DICTIONARY LOCATION: KTKO:BM.TRANDAT#
DATE: OCT 8, 1981

THIS DATASET CAN BE DESTROYED
THIS DATASET CAN BE REPLACED.
USE COUNT: 1

DATA SET DESCRIPTION:
THIS DATA FILE CONTAINS ALL THE FIELD, LAB AND LOCATIONAL INFORMATION COLLECTED FOR SELECTED CALGARY AREA SOIL UNITS USING THE RANDOM TRANSECT METHOD. CODING USED IS AS DOCUMENTED BELOW 10-08-81/KTKO

F(#)	FIELD NAME	ABBR	VALUE	DESCRIPTION	TYPE	LENGTH	DISP	SCALE FACTOR
F(1)	UNIQUE.RECORD.NO	URN	REQUIRED	THIS NUMBER UNIQUELY IDENTIFIES EACH SITE INVESTIGATED. ITIS USED TO JOIN TWO OR MORE FILES THAT CONTAIN DATA FOR THE SAME POINT.	U	2	0	
F(2)	SOIL.UNIT	UNIT	REQUIRED	THE MAP UNIT IS THE THREE LETTER SERIES CODE OF THE SERIES WHICH NAMES THE UNIT OR A FOUR LETTER CODE FORMED FROM THE FIRST TWO LETTERS OF SERIES OF EQUAL EXTENT	UC	1	2	
	CATEGORIES (ONLY)							
	ADY	ADY	1	ACADEMY				
	ATL	ATL	2	ANTLER				
	DEL	DEL	3	DELACOUR				
	DERK	DERK	4	DELACOUR ROCKYVIEW				
	DVG	DVG	5	DUNVARGAN				
	EBO	EBO	6	EAST BOW				
	ELB	ELB	7	ELBOW				
	FSH	FSH	8	FISH CREEK				
	LLK	LLK	10	LLOYD LAKE				
	LTC	LTC	11	LEIGHTON CENTRE				
	MDP	MDP	12	MIDNAPORE				
	MSB	MSB	13	MESA BUTTE				
	ORG	ORG	14	ORGANIC				
	POT	POT	15	POTHOLE CREEK				
	PUP	PUP	16	PORCUPINE				
	RKV	RKV	17	ROCKYVIEW				
	RSN	RSN	18	ROBINSON				
	SCO	SCO	19	STRATHCONA				
	SPR	SPR	20	SPRUCE RIDGE				
	SPY	SPY	21	SPY HILL				
	MDAD	MDAD	22	MIDNAPORE ACADEMY				
	SRC	SRC	23	SARCEE				
F(3)	SOIL.SERIES	SER	REQUIRED	THIS FIELD CONTAINS THE UNIQUE THREE LETTER SERIES CODE FOR THE SOIL FOUND AT A GIVEN SITE IF APPLICABLE	UC	1	3	

DICTIONARY DOCUMENTATION OF CALGARY TRANSECT DATA MANAGEMENT FILE (BM.TRANDAT)
(CONTINUED)

FOR: BM TRANDAT

F(#)	FIELD NAME	ABBR	VALUE	DESCRIPTION	TYPE	LENGTH	DISP	SCALE FACTOR
	CATEGORIES (ONLY)							
	ADY	ADY	1	ACADEMY				
	ATL	ATL	2	ANTLER				
	DEL	DEL	3	DELACOUR				
	DVG	DVG	5	DUNVARGAN				
	EBO	EBO	6	EAST BOW				
	ELB	ELB	7	ELBOW				
	FSH	FSH	8	FISH CREEK				
	H2O	H2O	9	WATER				
	LLK	LLK	10	LLOYD LAKE				
	LTC	LTC	11	LEIGHTON CENTRE				
	MDP	MDP	12	MIDNAPORE				
	MSB	MSB	13	MESA BUTTE				
	ORG	ORG	14	ORGANIC				
	POT	POT	15	POTHOLE CREEK				
	PUP	PUP	16	PORCUPINE				
	RKV	RKV	17	ROCKYVIEW				
	RSN	RSN	18	ROBINSON				
	SCO	SCO	19	STRATHCONA				
	SPR	SPR	20	SPRUCE RIDGE				
	SPY	SPY	21	SPY HILL				
	UNDEFINED	ND	0	NO SOIL SERIES HAS BEEN DEFINED FOR THIS SOIL	DEFAULT			
	SRC	SRC	23	SARCEE				
F(4)	UNIQUE TRAN.NO	UTN	REQUIRED	THE UNIQUE TRANSECT NUMBER IS THE KEY FIELD USED TO JOIN THIS FILE WITH THE FIELD AND LAB DATA FILES.	U	2	4	
F(5)	MAP UNIT.NO	U.NO	REQUIRED	THE MAP UNIT NUMBER IS A DIGIT WHICH ACTS AS A KEY TO THE LOCATION IN THE LEGEND WHERE THE PARTICULAR ASSEMBLAGE OF SOILS CHARACTERISTIC OF THIS UNIT IS DESCRIBED	U	1	6	
F(6)	TRANSECT NO	T NO	REQUIRED	THIS NUMBER IS THE ORIGINAL NUMBER OF THE TRANSECT CHOSEN FOR STUDY RANDOMLY FROM AMOUNG ALL THE NUMBERED TRANSECTS OF THIS UNIT	U	2	7	
F(7)	TOWNSHIP	TWP	REQUIRED	TOWNSHIP IN WHICH START OF TRANSECT IS LOCATED	U	1	9	
F(8)	RANGE	R	REQUIRED	RANGE IN WHICH START OF TRANSECT IS LOCATED.	U	1	10	
F(9)	DIRECTION	DIR		DIRECTION OF SITE WRT THE NAMED MERIDIAN	CC	1	11	

FOR: BM.TRANDAT

F(#)	FIELD NAME	ABBR	VALUE	DESCRIPTION	TYPE	LENGTH	DISP	SCALE FACTOR
	CATEGORIES (ONLY)							
	WEST	W	1	WEST OF NAMED MERIDIAN	DEFAULT			
	EAST	E	2	EAST OF NAMED MERIDIAN				
F(10)	MERIDIAN	MER		MERIDIAN FROM WHICH DIRECTION IS MEASURED	UC	1	12	
	CATEGORIES							
	5	5	5	FIFTH MERIDIAN	DEFAULT			
	4	4	4	FOURTH MERIDIAN				
F(11)	SURVEYOR	SURV		INITIALS OF SURVEYOR	CC	3	13	
	CATEGORIES							
	RM	RM	1	ROBERT MAC MILLAN	DEFAULT			
F(12)	DAY	DAY	REQUIRED	DAY	U	1	16	
F(13)	MONTH	MON	REQUIRED	MONTH	U	1	17	
F(14)	YEAR	YEAR		YEAR	UC	1	18	
	CATEGORIES							
	80	80	80	1980	DEFAULT			
F(15)	PROJECT	PROJ		THIS IS THE NAME OF THE MAPPING PROJECT BEING TESTED.	UC	1	19	
	CATEGORIES							
	CALGARY	CALG	1	CALGARY MAP AREA TRANSECT EVALUATION	DEFAULT			
F(16)	TRANSECT.LENGTH	TLEN	REQUIRED	THIS IS THE LENGTH OF THE TRANSECT IN METRES.	U	2	20	
F(17)	INTERVAL.DIST	INT	REQUIRED	THIS IS THE DISTANCE IN METRES BETWEEN OBSERVATION POINTS ALONG THE TRANSECT.	UC	2	22	
	CATEGORIES							
	NORMAL	NORM	120	THIS IS THE NORMAL INTERVAL SPACING IN METRES.	DEFAULT			
F(18)	NO.OF.OBSER	NOBS	REQUIRED	NUMBER OF OBSERVATIONS TAKEN ON THIS TRANSECT	U	1	24	
F(19)	SOIL CONTRAST	CON	REQUIRED	THE SOIL CONTRAST IS AN ESTIMATE OF THE SIMILARITY OF THE SOILAT A SITE TO THE SERIES WHICH NAMES THE MAP UNIT.	UC	1	25	
	CATEGORIES (ONLY)							
	NO CONTRAST	NCON	1	SOIL IS OF NAMING SERIES				
	LO.CONTRAST	LCON	2	SOIL RESEMBLES SERIES				
	MEDCONTRAST	MCON	3	SOIL SLIGHTLY RESEMBLES SERIES				
	HI.CONTRAST	HCON	4	SOIL OF LITTLE RESEMBLANCE				

DICTIONARY DOCUMENTATION OF CALGARY TRANSECT DATA MANAGEMENT FILE (BM.TRANDAT)
(CONTINUED)

FOR: BM.TRANDAT

F(#)	FIELD NAME	ABBR	VALUE	DESCRIPTION	TYPE	LENGTH	DISP	SCALE FACTOR
F(20)	SOIL.STATUS	STAT	REQUIRED	SOIL STATUS INDICATES WHETHER THE OBSERVED SOIL IS LISTEDAS OCCURRING IN THE MAP UNIT DESCRIPTION	UC	1	26	
	CATEGORIES (ONLY)							
	RECOGNIZED	REC	1	INCLUDED IN MAP UNIT DESCRIPTION	DEFAULT			
	NOT.RECOG	NREC	2	NOT MENTIONED IN ORIGINAL MAP UNIT DESCRIPTION				
F(21)	PARENT.1.MODE	P1.M	REQUIRED	PARENT.1.MODE	UC	1	27	
	CATEGORIES (ONLY)							
	TILL	TILL	8	TILL				
	GLACIOFLUV	FG	1	GLACIOFLUV				
	GLACIOLAC	LG	2	GLACIOLACUSTRINE				
	AEOLIAN	EOL	3	AEOLIAN				
	FLUVIAL	FLU	4	FLUVIAL				
	LACUSTRINE	LAC	5	LACUSTRINE				
	COLLUVIAL	COL	6	COLLUVIAL				
	RESIDUAL	RES	7	RESIDUAL				
	UNKNOWN	ND	0	UNKNOWN	DEFAULT			
	ORGANIC	ORG	9	ORGANIC				
F(22)	PARENT.1.TEXT	P1.T	REQUIRED	PARENT.1.TEXT	UC	1	28	
	CATEGORIES (ONLY)							
	GRAVELLY	GV	7	GV, SGV, GVS				
	CRS.SANDY	CS	1	S, LS				
	MED.SANDY	MS	2	SL, SCL				
	FINE SANDY	FS	3	SCL, SIL				
	FINE.LOAMY	FL	4	L, CL				
	FINE.SILTY	FM	5	SICL, SIC				
	FINE.CLAYEY	FC	6	C, HC				
	UNDIFF	ND	0	UNDIFF	DEFAULT			
	ORGANIC	ORG	8	ORGANIC				
F(23)	PARENT.1.SOURCE	P1.S		THIS REFERS TO THE PROVINENCE OF THE TILLS	UC	1	29	
	CATEGORIES (ONLY)							
	LAURENTIDE	L	1	EASTERN ORIGIN TILL				
	MIXED	M	2	MIXED ORIGIN TILL				
	CORDILLERAN	C	3	WESTERN ORIGIN TILL				
	NOT.APPL	ND	0	TILL PROVENANCE INFORMATION IS NOT APPLICABLE AT THIS SITE	DEFAULT			
F(24)	PARENT.2.MODE	P2.M		THIS REFERS TO ANY SECOND PARENT MATERIAL FOUND WITHIN THE PROFILE DEPTH	UC	1	30	
	CATEGORIES (ONLY)							
	TILL	TILL	8	TILL				
	GLACIOFLUV	FG	1	GLACIOFLUV				

DICTIONARY DOCUMENTATION OF CALGARY TRANSECT DATA MANAGEMENT FILE (BM.TRANDAT)
(CONTINUED)

FOR: BM.TRANDAT

F(#)	FIELD NAME	ABBR	VALUE	DESCRIPTION	TYPE	LENGTH	DISP	SCALE FACTOR
	CATEGORIES (CONTINUED)							
	GLACIOLAC	LG	2	GLACIOLACUSTRINE				
	AEOLIAN	EOL	3	AEOLIAN				
	FLUVIAL	FLU	4	FLUVIAL				
	LACUSTRINE	LAC	5	LACUSTRINE				
	COLLUVIAL	COL	6	COLLUVIAL				
	RESIDUAL	RES	7	RESIDUAL				
	NOT APPL	ND	0	NO SECOND PARENT MATERIAL WAS NOTED AT THIS SITE	DEFAULT			
	UNKNOWN	UN	9	SECOND PARENT MATERIAL OF UNKNOWN ORIGIN				
F(25)	PARENT.2.TEXT	P2.T		THIS REFERS TO ANY SECOND PARENT MATERIAL FOUND WITHIN THE PROFILE DEPTH	UC	1	31	
	CATEGORIES (ONLY)							
	GRAVELLY	GV	7	GV, SGV, GVS				
	CRS.SANDY	CS	1	S, LS				
	MED.SANDY	MS	2	SL, SCL				
	FINE.SANDY	FS	3	SCL, SIL				
	FINE.LOAMY	FL	4	L, CL				
	FINE.SILTY	FM	5	SICL, SIC				
	FINE.CLAYEY	FC	6	C, HC				
	NOT.APPL	ND	0	NO SECOND PARENT MATERIAL WAS NOTED AT THIS SITE.	DEFAULT			
	UNDIFF	UN	8	UNDIFF				
F(26)	PARENT.2.SOURCE	P2.S		THIS REFERS TO ANY SECOND PARENT MATERIAL FOUND WITHIN THE PROFILE DEPTH.	UC	1	32	
	CATEGORIES (ONLY)							
	LAURENTIDE	L	1	EASTERN ORIGIN TILL				
	MIXED	M	2	MIXED ORIGIN TILL				
	CORDILLERAN	C	3	WESTERN ORIGIN TILL				
	NOT.APPL	ND	0	TILL PROVENANCE INFORMATION IS NOT APPLICABLE AT THIS SITE.	DEFAULT			
F(27)	PHASE.1	P1		USED WHEN GLEYED SUBGROUP IS RECOGNIZED, SAVES REPETITION	UC	1	33	
	CATEGORIES							
	GLEYED	GL	1	USED WHEN GLEYED SUBGROUP IS RECOGNIZED.				
	NOT.APPL	ND	0	INFORMATION STORED IN THIS FIELD IS NOT APPLICABLE INTHIS CASE.	DEFAULT			
F(28)	SUBGROUP	SG	REQUIRED	SUBGROUP	UC	1	34	
	CATEGORIES (ONLY)							
	ALKALINE	A	1	ALKALINE SOLONETZ				
	BLACK	BL	2	BLACK SUBGROUP				
	BROWN	B	3	BROWN SUBGROUP				

DICTIONARY DOCUMENTATION OF CALGARY TRANSECT DATA MANAGEMENT FILE (BM TRANDAT)
(CONTINUED)

FOR BM TRANDAT

F(#)	FIELD NAME	ABBR	VALUE	DESCRIPTION	TYPE	LENGTH	DISP	SCALE FACTOR
	CATEGORIES (CONTINUED)							
	BRUNISOLIC	BR	4	BRUNISOLIC SUBGROUP				
	CALCAREOUS	CA	5	CALCAREOUS SUBGROUP				
	CUMULIC	CU	6	CUMULIC SUBGROUP				
	DARK	C	7	DARK SUBGROUP				
	DARK.BROWN	DB	8	DARK BROWN SUBGROUP				
	DARK GRAY	DG	9	DARK GRAY SUBGROUP				
	ELUVIATED	E	10	DARK GRAY SUBGROUP				
	FERRA	FE	11	FERRA SUBGROUP				
	GRAY	G	12	GRAY SUBGROUP				
	HUMIC	HU	13	HUMIC SUBGROUP				
	ORTHIC	O	14	ORTHIC SUBGROUP				
	PODZOLIC	PZ	15	PODZOLIC SUBGROUP				
	REGO	R	16	REGO SUBGROUP				
	SOLONETZIC	SZ	17	SOLONETZIC SUBGROUP				
	TYPIC	TY	18	TYPIC SUBGROUP				
	UNKNOWN	ND	99	SUBGROUP CLASSIFICATION UNDETERMINED	DEFAULT			
	GLEYED	GL	19	GLEYED SUBGROUP				
	TERRIC	TR	20	TERRIC SUBGROUP				
F(29)	GREAT.GROUP	GG	REQUIRED	GREAT.GROUP	UC	1	35	
	CATEGORIES (ONLY)							
	MEL.BRUN	MB	1	MEL BRUN				
	EUT.BRUN	EB	2	EUTRIC BRUNISOL				
	SOMB BRUN	SB	3	SOMBRIS BRUNISOL				
	DYST BRUN	DYB	4	DYSTRIC BRUNISOL				
	BROWN	B	5	BROWN CHERNOZEMIC				
	DARK.BROWN	DB	6	DARK BROWN CHERNOZEMIC				
	BLACK	BL	7	BLACK CHERNOZEMIC				
	DARK GRAY	DG	8	DARK GRAY CHERNOZEMIC				
	HUMIC.GLEY	HG	9	HUMIC GLEYSOL				
	GLEYSOL	G	10	GLEYSOL				
	LUVIC GLEY	LG	11	LUVIC GLEYSOL				
	GREY.LUV	GL	12	GREY LUVISOL				
	FIBRISOL	F	13	FIBRISOL				
	MESISOL	M	14	MESISOL				
	HUMISOL	H	15	HUMISOL				
	HU.FER PODZ	HFP	16	HUMO FERRIC PODZOL				
	REGOSOL	R	17	REGOSOL				
	HU REGOSOL	HR	18	HUMIC REGOSOL				
	SOLONETZ	SZ	19	SOLONETZ				
	SO.SOLONETZ	SS	20	SOLODIZED SOLONETZ				
	SOLOD	SO	21	SOLOD				
F(30)	SOIL ORDER	ORD	REQUIRED	SOIL ORDER	UC	1	36	
	CATEGORIES (ONLY)							
	BRUNISOLIC	BRUN	1	BRUNISOLIC				
	CHERNOZEMIC	CHER	2	CHERNOZEMIC				
	GLEYSOLIC	GLEY	3	GLEYSOLIC				

F(#)	FIELD NAME	ABBR	VALUE	DESCRIPTION	TYPE	LENGTH	DISP	SCALE	FACTOR
	CATEGORIES (CONTINUED)								
	LUVISOLIC	LUV	4	LUVISOLIC					
	ORGANIC	ORG	5	ORGANIC					
	PODZOLIC	PODZ	6	PODZOLIC					
	REGOSOLIC	REGO	7	REGOSOLIC					
	SOLONETZIC	SOLZ	8	SOLONETZIC					
	UNDECIDED	ND	C	DECISION REGARDING CLASSIFICATION NOT TAKEN	DEFAULT				
F(31)	PHASE.2	P2		PHASES OF SOIL SERIES	UC	1	37		
	CATEGORIES (ONLY)								
	NOT.APPL	ND	0	NO PHASE 2 WAS RECOGNIZED AT THIS SITE	DEFAULT				
	CARBONATED	C	1	CARBONATED					
	CRYIC	CR	2	CRYIC					
	CUMULIC	CU	3	CUMULIC					
	ERODED	E	4	ERODED					
	LITHIC	L	5	LITHIC					
	PEATY	P	6	PEATY					
	SALINE	N	7	SALINE					
	STONY	S	8	STONY					
	THIN	T	9	THIN					
	TURBIC	TURB	10	TURBIC					
F(32)	AH.THICKNESS	AH.T		AH THICKNESS	UC	1	38		
	CATEGORIES								
	NO.AH	ND	0	AH IS NOT PRESENT	DEFAULT				
F(33)	AHE.THICKNESS	AHET		THIS FIELD CONTAINS THE VALUE FOR THE THICKNESSOF THE AHE HORIZON IN CM. IF PRESENT.	UC	1	39		
	CATEGORIES								
	NO.DATA	ND	0	THIS VALUE IS STORED WHEN THERE IS NO AHE PRESENT	DEFAULT				
F(34)	AE.THICKNESS	AE.T		THIS FIELD CONTAINS THE VALUE IN CM FOR THE THICKNESSOF THE AE HORIZON , IF PRESENT	UC	1	40		
	CATEGORIES								
	NO.DATA	ND	0	THIS VALUE IS STORED WHEN THERE IS NO AE PRESENT	DEFAULT				
F(35)	B.THICKNESS	B.TH	REQUIRED	THIS FIELD CONTAINS THE VALUE IN CM FOR THE THICKNESSOF THE B HORIZON, IF PRESENT	UC	1	41		
	CATEGORIES								
	NO.DATA	ND	0	THIS VALUE IS STIRED WHEN THERE IS NO B HORIZON PRESENT	DEFAULT				
F(36)	LIME.DEPTH	LIME		THIS FIELD CONTAINS THE VALUE FOR	UC	2	42		

F(#)	FIELD NAME	ABBR	VALUE	DESCRIPTION	TYPE	LENGTH	DISP	SCALE	FACTOR
				THE DEPTH TO LIMEIN CM AS INDICATED BY EFFERVESENCE IN HCL					
	CATEGORIES								
	NO.LIME	ND	999	THIS VALUE IS STORED WHEN NO LIME IS ENCOUNTEREDWITHIN THE DEPTH OF INVESTIGATION (USUALLY 1 METRE)	DEFAULT				
	SURF.LIME	SURF	0	A VALUE OF 0 IS STORED WHEN LIME OCCURS TO THE SURFACE					
F(37)	PARENT.2.DEPTH	P2.D		THIS FIELD CONTAINS THE VALUE IN CM FOR THE DEPTH TO ASECOND PARENT MATERIAL, IF PRESENT	UC	2	44		
	CATEGORIES								
	NO.DATA	ND	999	THIS VALUE IS STORED WHEN NO SECOND PARENT MATERIALIS FOUND WITHIN THE DEPTH OF INVESTIGATION,	DEFAULT				
F(38)	A.COLOR.VALUE	AVAL		THIS IS THE MUNSELL SOIL COLOR VALUE OF THE HORIZONBEING DESCRIBED	UC	1	46		
	CATEGORIES (ONLY)								
	NO.DATA	ND	0	NO COLOR OBSERVATION OF THIS HORIZON WAS POSSIBLE	DEFAULT				
	10YR	10YR	1	10YR					
	2.5Y	2.5Y	2	2.5Y					
	7.5YR	75YR	3	7.5YR					
	5Y	5Y	4	5Y					
	5G	5G	5	5G					
F(39)	A.COLOR.HUE	AHUE		THIS FIELD CONTAINS THE COLOR HUE OF THE HORIZONBEING DESCRIBED	UC	1	47		
	CATEGORIES								
	NO.DATA	ND	0	THIS VALUE IS STORED WHEN NO COLOR OBSERVATION HAS BEEN TAKEN	DEFAULT				
F(40)	A.COLOR.CHROMA	ACHR		THIS FIELD CONTAINS THE COLOR CHROMA OF THE HORIZONBEING DESCRIBED	UC	1	48		
	CATEGORIES								
	NO.DATA	ND	0	THIS VALUE IS STORED WHEN NO OBSERVATION OF SOILCHROMA HAS BEEN TAKEN	DEFAULT				
F(41)	B.COLOR.VALUE	BVAL		THIS FIELD STORES THE COLOR VALUE OF THE B HORIZON	UC	1	49		
	CATEGORIES (ONLY)								
	NO.DATA	ND	0	NO COLOR OBSERVATION OF THIS HORIZON WAS POSSIBLE.	DEFAULT				
	10YR	10YR	1	10YR					
	2.5Y	2 5Y	2	2.5Y					

F(#)	FIELD NAME	ABBR	VALUE	DESCRIPTION	TYPE	LENGTH	DISP	SCALE	FACTOR
	CATEGORIES (CONTINUED)								
	7.5YR	75YR	3	7.5YR					
	5Y	5Y	4	5Y					
	5G	5G	5	5G					
F(42)	B.COLOR.HUE	BHUE		THIS FIELD STORES THE COLOR HUE OF THE B HORIZON	UC	1	50		
	CATEGORIES								
	NO.DATA	ND	0	THIS VALUE IS STORED WHEN NO COLOR OBSERVATION HAS BEEN TAKEN.	DEFAULT				
F(43)	B COLOR.CHROMA	BCHR		THIS FIELD STORES THE COLOR CHROMA OF THE B HORIZON	UC	1	51		
	CATEGORIES								
	NO.DATA	ND	0	THIS VALUE IS STORED WHEN NO OBSERVATION OF SOILCHROMA HAS BEEN TAKEN.	DEFAULT				
F(44)	C.COLOR.VALUE	CVAL		THIS FIELD STORES THE COLOR VALUE OF THE C HORIZON.	UC	1	52		
	CATEGORIES (ONLY)								
	NO.DATA	ND	0	NO COLOR OBSERVATION OF THIS HORIZON WAS POSSIBLE.	DEFAULT				
	10YR	10YR	1	10YR					
	2.5Y	2.5Y	2	2.5Y					
	7.5YR	75YR	3	7.5YR					
	5Y	5Y	4	5Y					
	5G	5G	5	5G					
F(45)	C.COLOR.HUE	CHUE		THIS FIELD STORES THE COLOR HUE OF THE C HORIZON.	UC	1	53		
	CATEGORIES								
	NO.DATA	ND	0	THIS VALUE IS STORED WHEN NO COLOR OBSERVATION HAS BEEN TAKEN.	DEFAULT				
F(46)	C.COLOR.CHROMA	CCHR		THIS FIELD STORES THE COLOR CHROMA OF THE C HORIZON.	UC	1	54		
	CATEGORIES								
	NO.DATA	ND	0	THIS VALUE IS STORED WHEN NO OBSERVATION OF SOILCHROMA HAS BEEN TAKEN	DEFAULT				
F(47)	B.STRUCTURE.GRAD	BGRD		THIS FIELD STORES THE GRADE OF THE PRIMARY STRUCTURE OBSERVED IN THE B HORIZON	UC	1	55		
	CATEGORIES (ONLY)								
	NO.STRUCT	SL	1	THE B HORIZON IS STRUCTURELESS					
	VERY.WEAK	VW	2	THE B HORIZON HAS VERY WEAK STRUCTURE					
	WEAK	W	3	THE B HORIZON HAS WEAK STRUCTURE					

DICTIONARY DOCUMENTATION OF CALGARY TRANSECT DATA MANAGEMENT FILE (BM TRANDAT)
(CONTINUED)

FOR: BM TRANDAT

F(#)	FIELD NAME	ABBR	VALUE	DESCRIPTION	TYPE	LENGTH	DISP	SCALE	FACTOR
	CATEGORIES (CONTINUED)								
	WEAK.MOD	WM	4	THE B HORIZON HAS WEAK TO MODERATE STRUCTURE					
	MODERATE	M	5	THE B HORIZON HAS MODERATE STRUCTURE					
	MOD.STRONG	MS	6	THE B HORIZON HAS MODERATE TO STRONG STRUCTURE					
	STRONG	ST	7	THE B HORIZON HAS STRONG STRUCTURE					
	NO.DATA	ND	0	NO DATA FOR B HORIZON GRADE OF STRUCTURE WAS TAKEN	DEFAULT				
F(48)	B.STRUCTURE.CLAS	BCLS		THIS FIELD CONTAINS STORED VALUES PERTAINING TO THE CLASS OF THE PRIMARY B STRUCTURE	UC	1	56		
	CATEGORIES (ONLY)								
	VERY.FINE	VF	1	VERY FINE STRUCTURE					
	V.F TO.F	VFF	2	VERY FINE TO FINE STRUCTURE					
	FINE	F	3	FINE STRUCTURE					
	FINE TO MED	FM	4	FINE TO MEDIUM STRUCTURE					
	MEDIUM	M	5	MEDIUM STRUCTURE					
	MED.TO.CRS	MC	6	MEDIUM TO COARSE STRUCTURE					
	COARSE	C	7	COARSE STRUCTURE					
	VERY.COARSE	VC	8	VERY COARSE STRUCTURE					
	NO.DATA	ND	0	NO OBSERVATION ON CLASS OF B STRUCTURE WAS TAKEN.	DEFAULT				
F(49)	B.STRUCTURE.KIND	BKND		THIS FIELD STORES THE INFORMATION RELATINGTO THE KIND OF STRUCTURE FOUND IN THE B HORIZON	UC	1	57		
	CATEGORIES (ONLY)								
	PLATY	PL	1	PLATY STRUCTURE					
	PRISMATIC	PR	2	PRISMATIC STRUCTURE					
	COLUMNAR	COL	3	COLUMNAR STRUCTURE					
	ANG BLOCKY	AB	4	ANGULAR BLOCKY STRUCTURE					
	SUBANG BLOK	SAB	5	SUBANGULAR BLOCKY STRUCTURE					
	GRANULAR	GRAN	6	GRANULAR STRUCTURE					
	MASSIVE	MASS	7	MASSIVE STRUCTURE					
	SINGL.GRAIN	SGR	8	SINGLE GRAIN STRUCTURE					
	CLODDY	CLOD	9	CLODDY STRUCTURE					
	NO DATA	ND	0	NO DATA ON THE KIND OF STRUCTURE IN THE BHORIZON IS AVAILABLE	DEFAULT				
F(50)	B.HORIZON TYPE	BTYP		THIS FIELD CONTAINS INFORMATION ABOUT THE KIND OF B HORIZON FOUND AT A SITE.	UC	1	58		
	CATEGORIES (ONLY)								
	BM	BM	1	BM HORIZON					
	BT	BT	2	BT HORIZON					
	BTG	BTG	3	BTG HORIZON					
	BNT	BNT	4	BNT HORIZON					

DICTIONARY DOCUMENTATION OF CALGARY TRANSECT DATA MANAGEMENT FILE (BM.TRANDAT)
(CONTINUED)

FOR: BM.TRANDAT

F(#)	FIELD NAME	ABBR	VALUE	DESCRIPTION	TYPE	LENGTH	DISP	SCALE	FACTOR
	CATEGORIES (CONTINUED)								
	BC	BC	5	BC HORIZON					
	BG	BG	6	BG HORIZON					
	BN	BN	7	BN HORIZON					
	BMK	BMK	8	BMK HORIZON					
	NO.DATA	ND	0	NO OBSERVATION OF B HORIZONWAS POSSIBLE	DEFAULT				
F(51)	C.%.COARSE.FRAGS	CF.C		THIS FIELD CONTAINS A VALUE FOR THE % COARSE FRAGMENTCONTENT FOUND IN THE C HORIZON.	UC	1	59		
	CATEGORIES								
	NO.DATA	ND	0	NO OBSERVATION OF COARSE FRAGMENT CONTENT WAS TAKEN.	DEFAULT				
F(52)	SLOPE.PCT	SLOP		THIS FIELD STORES THE SLOPE % DETERMINED AT THE SITE.	UC	1	60		
	CATEGORIES								
	NO.DATA	ND	0	NO SLOPE OBSERVATION IS AVAILABLEFOR THIS SITE.	DEFAULT				
F(53)	SLOPE.POSITION	SL.P		SLOPE.POSITION	UC	1	61		
	CATEGORIES (ONLY)								
	CREST	CR	1	CREST					
	UPPER	UP	2	UPPER					
	MID	MID	3	MID					
	LOWER	LOW	4	LOWER					
	TOE	TOE	5	TOE					
	DEPRESSION	DEP	6	DEPRESSION					
	NO.DATA	ND	0	NO.DATA	DEFAULT				
F(54)	LANDSCAPE	LAND		THIS FIELD CONTAINS ADESIGNATION OF THE DOMINANT LANDSCAPE AT THE SITE.	UC	1	62		
	CATEGORIES (ONLY)								
	APRON	AP	1	APRON					
	DELTA	DELT	2	DELTA					
	FLOOD.PLAIN	F.P	4	FLOOD.PLAIN					
	HUMMOCKY	HUM	5	HUMMOCKY					
	INCLINED	IN	6	INCLINED					
	LEVEL	LV	7	LEVEL					
	RIDGED	RDG	8	RIDGED					
	ROLLING	ROL	9	ROLLING					
	TERRACED	TR	10	TERRACED					
	UNDULATING	UN	11	UNDULATING					
	NO DATA	ND	0	NO.DATA	DEFAULT				
	FAN	FAN	3	FAN					
F(55)	A.FIELD.TEXTURE	ATEX	REQUIRED	USDA TEXTURE OF A HORIZON	UC	1	63		

DICTIONARY DOCUMENTATION OF CALGARY TRANSECT DATA MANAGEMENT FILE (BM TRANDAT)
(CONTINUED)

FOR: BM.TRANDAT

F(#)	FIELD NAME	ABBR	VALUE	DESCRIPTION	TYPE	LENGTH	DISP	SCALE	FACTOR
	CATEGORIES (ONLY)								
	SAND	S	1	SAND					
	LOAMY.SAND	LS	2	LOAMY SAND					
	SANDY.LOAM	SL	3	SANDY LOAM					
	SANDY.CL	SCL	4	SANDY CL					
	LOAM	L	5	LOAM					
	SILT.LOAM	SIL	6	SILT.LOAM					
	SILT	SI	7	SILT					
	SILTY.CL	SICL	8	SILTY CLAY LOAM					
	CLAY.LOAM	CL	9	CLAY.LOAM					
	SILTY.CLAY	SIC	10	SILTY.CLAY					
	SANDY.CLAY	SC	11	SANDY.CLAY					
	CLAY	C	12	CLAY					
	HEAVY CLAY	HC	13	HEAVY.CLAY					
	GRAVEL	GV	14	GRAVEL					
	SANDY GRAV	SGV	15	SANDY GRAV					
	GRAV SAND	GS	16	GRAV SAND					
	PEATY	PT	17	PEATY					
	LFH	LFH	18	LFH					
	NO.DATA	ND	0	NO.DATA	DEFAULT				
F(56)	B.FIELD.TEXT	BTEX	REQUIRED	USDA TEXTURE OF THE B HORIZON.	UC	1	64		
	CATEGORIES (ONLY)								
	SAND	S	1	SAND					
	LOAMY.SAND	LS	2	LOAMY SAND					
	SANDY.LOAM	SL	3	SANDY LOAM					
	SANDY.CL	SCL	4	SANDY.CL					
	LOAM	L	5	LOAM					
	SILT.LOAM	SIL	6	SILT.LOAM					
	SILT	SI	7	SILT					
	SILTY CL	SICL	8	SILTY CLAY LOAM					
	CLAY.LOAM	CL	9	CLAY LOAM					
	SILTY.CLAY	SIC	10	SILTY CLAY					
	SANDY.CLAY	SC	11	SANDY.CLAY					
	CLAY	C	12	CLAY					
	HEAVY.CLAY	HC	13	HEAVY CLAY					
	GRAVEL	GV	14	GRAVEL					
	SANDY GRAV	SGV	15	SANDY.GRAV					
	GRAV.SAND	GS	16	GRAV SAND					
	PEATY	PT	17	PEATY					
	LFH	LFH	18	LFH					
	NO DATA	ND	0	NO DATA	DEFAULT				
F(57)	C.FIELD.TEXT	CTEX	REQUIRED	USDA TEXTURE OF THE C HORIZON	UC	1	65		
	CATEGORIES (ONLY)								
	SAND	S	1	SAND					
	LOAMY.SAND	LS	2	LOAMY.SAND					
	SANDY.LOAM	SL	3	SANDY LOAM					
	SANDY.CL	SCL	4	SANDY.CL					
	LOAM	L	5	LOAM					

DICTIONARY DOCUMENTATION OF CALGARY TRANSECT DATA MANAGEMENT FILE (BM.TRANDAT)
(CONTINUED)

FOR: BM.TRANDAT

F(#)	FIELD NAME	ABBR	VALUE	DESCRIPTION	TYPE	LENGTH	DISP	SCALE	FACTOR
	CATEGORIES (CONTINUED)								
	SILT.LOAM	SIL	6	SILT LOAM					
	SILT	SI	7	SILT					
	SILTY.CL	SICL	8	SILTY CLAY LOAM					
	CLAY.LOAM	CL	9	CLAY.LOAM					
	SILTY CLAY	SIC	10	SILTY.CLAY					
	SANDY.CLAY	SC	11	SANDY.CLAY					
	CLAY	C	12	CLAY					
	HEAVY.CLAY	HC	13	HEAVY.CLAY					
	GRAVEL	GV	14	GRAVEL					
	SANDY.GRAV	SGV	15	SANDY.GRAV					
	GRAV SAND	GS	16	GRAV SAND					
	PEATY	PT	17	PEATY					
	LFH	LFH	18	LFH					
	NO.DATA	ND	0	NO.DATA	DEFAULT				
F(58)	DRAINAGE.CLASS	DRAN		SOIL DRAINAGE CLASS AS OUTLINED IN CANSIS MANUAL.	UC	1	66		
	CATEGORIES (ONLY)								
	VERY.RAPID	VRAP	1	VERY RAPID DRAINAGE					
	RAPID	RAP	2	RAPID DRAINAGE					
	WELL	WELL	3	WELL DRAINED					
	MOD.WELL	MOD	4	MODERATELY WELL DRAINED					
	IMPERFECT	IMP	5	IMPERFECTLY DRAINED					
	POOR	POOR	6	POORLY DRAINED					
	VERY.POOR	VPOR	7	VERY POORLY DRAINED					
	NOT.APPL	ND	0	DRAINAGE CLASS NOT DETERMINED	DEFAULT				
F(59)	LFH.THICKNESS	LFHT		THIS FIELD CONTAINS A VALUE FOR THE THICKNESS OF THE LFH HORIZON IF PRESENT.	UC	1	67		
	CATEGORIES								
	NO.LFH	ND	0	NO LFH HORIZON WAS RECOGNIZED	DEFAULT				
F(60)	SAND	S		PERCENT SAND OF THE C HORIZON BY HYDROMETER METHOD	UC	2	68	/	10
	CATEGORIES								
	NO.SAMP	NS	998	NO SAMPLE WAS OBTAINED AT THIS SITE	DEFAULT				
	MISSING	ND	999	THE ANALYSIS WAS NOT DONE FOR THIS SAMPLE.	DEFAULT				
F(61)	SILT	SI		PERCENT SILT OF THE C HORIZON BY HYDROMETER METHOD	UC	2	70	/	10
	CATEGORIES								
	NO.SAMP	NS	998	NO SAMPLE WAS OBTAINED AT THIS SITE	DEFAULT				
	MISSING	ND	999	THE ANALYSIS WAS NOT DONE FOR THIS SAMPLE	DEFAULT				
F(62)	CLAY	C		PERCENT CLAY IN SAMPLE DETERMINED BY HYDROMETER METHOD.	UC	2	72	/	10

DICTIONARY DOCUMENTATION OF CALGARY TRANSECT DATA MANAGEMENT FILE (BM.TRANDAT)
(CONTINUED)

FOR: BM TRANDAT

F(#)	FIELD NAME	ABBR	VALUE	DESCRIPTION	TYPE	LENGTH	DISP	SCALE	FACTOR
	CATEGORIES								
	NO SAMP	NS	998	NO SAMPLE WAS OBTAINED AT THIS SITE	DEFAULT				
	MISSING	ND	999	THE ANALYSIS WAS NOT DONE FOR THIS SAMPLE.	DEFAULT				
F(63)	USDA TEXT	USDA		USDA TEXTURE OF THE C HORIZON SAMPLE	UC	1	74		
	CATEGORIES (ONLY)								
	SAND.	S.	1	SAND					
	LOAMY.SAND	LS	2	LOAMY SAND					
	SANDY.LOAM	SL	3	SANDY LOAM					
	SANDY.CL	SCL	4	SANDY CLAY LOAM					
	LOAM	L	5	LOAM					
	SILT.LOAM	SIL	6	SILT LOAM					
	SILT.	SI.	7	SILT					
	SILTY.CL	SICL	8	SILTY CLAY LOAM					
	CLAY.LOAM	CL	9	CLAY LOAM					
	SILTY.CLAY	SIC	10	SILTY CLAY					
	SANDY.CLAY	SC	11	SANDY CLAY					
	CLAY.	C.	12	CLAY					
	HEAVY.CLAY	HC	13	HEAVY CLAY					
	GRAVEL	GV	14	GRAVEL					
	NO.DATA	ND	99	NO USDA TEXTURE DETERMINED	DEFAULT				
F(64)	UNIFIED	USSC		UNIFIED SYSTEM OF SOIL CLASSIFICATION	UC	1	75		
	CATEGORIES (ONLY)								
	CH	CH	1	INORGANIC CLAYS OF HIGH PLASTICITY					
	CL	CL	2	INORGANIC CLAYS OF MEDIUM TO LOW PLASTICITY					
	MH	MH	3	HIGHLY ELASTIC ORGANIC SILTS AND SILT-CLAYS					
	ML	ML	4	ORGANIC AND INORGANIC SILTS AND SILT-CLAYS					
	OH	OH	5	HIGHLY ELASTIC ORGANIC CLAYS AND SILTS					
	OL	OL	6	ORGANIC SILTS AND SILT-CLAYS					
	SF	SF	7	VERY FINE SILTY SANDS.					
	GW	GW	8	WELL GRADED GRAVELS					
	GP	GP	9	POORLY GRADED GRAVELS					
	SW	SW	10	WELL GRADED SANDS					
	SP	SP	11	POORLY GRADED SANDS					
	GC	GC	12	CLAYEY GRAVELS					
	GM	GM	13	SILTY GRAVELS					
	SC	SC	14	CLAYEY SANDS					
	SM	SM	15	SILTY SANDS					
	ND	ND	99	NOT DETERMINED	DEFAULT				
F(65)	PLASTIC.LIMIT	WP		MOISTURE CONTENT AT PLASTIC LIMIT	UC	2	76	/	10

F(#)	FIELD NAME	ABBR	VALUE	DESCRIPTION	TYPE	LENGTH	DISP	SCALE	FACTOR
	CATEGORIES								
	ND	ND	999	PLASTIC LIMIT NOT DETERMINED	DEFAULT				
	NON.PLASTIC	NP	0	SAMPLE WAS NON PLASTIC IN BEHAVIOUR					
F(66)	LIQUID.LIMIT	WL		MOISTURE CONTENT AT LIQUID LIMIT	UC	2	78	/	10
	CATEGORIES								
	ND	ND	999	LIQUID LIMIT NOT DETERMINED	DEFAULT				
	NON LIQUID	NL	0	SAMPLE WAS NON LIQUID IN BEHAVIOUR					
F(67)	PLASTIC.INDEX	IP		DIFFERENCE BETWEEN LIQUID LIMIT AND PLASTIC LIMIT	UC	2	80	/	10
	CATEGORIES								
	ND	ND	999	PLASTICITY INDEX NOT DETERMINED.	DEFAULT				
F(68)	CARBONATE	CACO		PERCENT CACO3 EQUIVALENT OF THE C HORIZON	UC	2	82	/	10
	CATEGORIES								
	ND	ND	9998	NO DETERMINATION OF CARBONATE EQUIVALENT WAS MADE.	DEFAULT				
	MS	MS	9999	SAMPLE WAS MISSING FOR THIS SITE.	DEFAULT				
F(69)	A.CARBONATE	AC03		PERCENT CACO3 EQUIVALENT OF THE A HORIZON	UC	2	84	/	100
	CATEGORIES								
	ND	ND	9999	NO DETERMINATION OF CARBONATE EQUIVALENT WAS MADE	DEFAULT				
F(70)	ELEC.COND	EC		ELECTRICAL CONDUCTIVITY OF THE C HORIZON SAMPLE.	UC	2	86	/	10
	CATEGORIES								
	ND	ND	998	NO DETERMINATION MADE	DEFAULT				
	MS	MS	999	SAMPLE MISSING	DEFAULT				
F(71)	SURFACE.PH	PHA		PH IN CACL2 OF THE SURFACE HORIZON	UC	1	88	/	10
	CATEGORIES								
	ND	ND	98	NO DETERMINATION OF PH WAS MADE	DEFAULT				
	MS	MS	99	SAMPLE WAS MISSING.	DEFAULT				
F(72)	SUBSOIL.PH	PHC		PH IN CACL2 OF THE SUBSURFACE HORIZON (CCA OR CK).	UC	1	89	/	10
	CATEGORIES								
	ND	ND	98	NO DETERMINATION OF PH WAS MADE	DEFAULT				
	MS	MS	99	SAMPLE WAS MISSING.	DEFAULT				
F(73)	A.ORGANIC.CARB	CARB		PERCENT ORGANIC CARBON IN THE A HORIZON	UC	2	90	/	100
	CATEGORIES								
	ND	ND	9998	NO DETERMINATION OF ORGANIC CARBON WAS MADE	DEFAULT				
	MS	MS	9999	SAMPLE WAS MISSING FOR THIS SITE.	DEFAULT				

F(#)	FIELD NAME	ABBR	VALUE	DESCRIPTION	TYPE	LENGTH	DISP	SCALE	FACTOR
F(74)	NEWCLAY	NEWC			S	4	92	/	10
F(75)	NEWMSILT	NEWM			S	4	96	/	100
F(76)	NEWSAND	NEWS			S	4	100	/	100

Sample Field Coding Sheet

UNIQUE TRANSECT NUMBER: 52

UNIT NAME	Unit #	Transect #	Township	Range	Direction	Surveyor	Date D M Y	Project	Interval Distance	Total Transect Length
ADY	1	99	22	1	W5	RM	15-10-80	CALG	120	1200

SITE NUMBER	1	2	3	4	5	6	7	8	9	10
Unique Record No.	341	342	343	344	345	346	347	348	349	350
Soil Series	EBO	~~ADY~~ RKV	RKV	EBO	RKV	ND	EBO	RKV	ADY	ADY
Soil Contrast	MCON	LCON	LCON	MCON	LCON	LCON	MCON	LCON	NCON	NCON
Soil Status	REC	REC	REC	REC	REC	REC	REC	REC	REC	REC
Phase I	–	–	–	–	–	–	–	–	–	–
Soil Subgroup	R	O	O	R	O	CA	R	O	O	O
Soil Great Group	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL
Soil Order	CHER	CHER	CHER	CHER	CHER	CHER	CHER	CHER	CHER	CHER
Phase II	C	–	–	–	–	–	–	–	–	–
PM1 Mode	EOL	LAC	LAC	EOL	EOL	EOL	EOL	EOL	TILL	TILL
PM1 Text	FM	FM	FM	FM	FM	FM	FM	FM	FL	FL
PM1 Source	–	–	–	–	–	–	–	–	M	M
PM2 Mode	TILL	TILL	TILL	TILL	TILL	TILL	TILL	TILL	ND	ND
PM2 Text	FM	FM	FM	FM	FM	FM	FM	FM	ND	ND
PM2 Source	M	M	M	M	M	M	M	M	–	–
Ah Thickness	15	12	32	13	20	15	16	22	12	14
Ahe Thickness	–	–	–	–	–	–	–	–	–	–
Ae Thickness	–	–	–	–	–	–	–	–	–	–
B Thickness	0	7	23	0	19	15	0	28	18	16
Lime Depth	0	A	55	0	39	0	16	50	30	30
Mottle Depth	–	–	–	–	–	–	–	–	–	–
Water Table Depth	–	–	–	–	–	–	–	–	–	–
Bedrock Depth	–	–	–	–	–	–	–	–	–	–
2nd PM Depth	60	90	65	60	70	70	80	90	–	–
A Value	10YR	10YR	10YR	10YR	10YR	10YR	10YR	10YR	10YR	10YR
A Hue	2	2	2	2	2	2	2	2	2	2
A Chroma	1	1	1	1	1	1	1	1	1	1
B Value		10YR	10YR		10YR	10YR		10YR	10YR	10YR
B Hue		4	4		4	4		3	3	3
B Chroma		3	3		3	3		3	3	3
C Value	10YR	10YR	10YR	10YR	2.5Y	2.5Y	2.5Y	2.5Y	10YR	10YR
C Hue	6	5	5	5	5	5	5	5	5	5
C Chroma	3	3	2	3	2	2	2	2	3	2
B Structure Grade		W	W		W	W		W	M	M
Class		M	M		M	M		M	M	M
Kind		PR	[illegible]		PR	PR		PR	PR	PR
B Type		BM	BM		BM	BMK		BM	BM	BM
B % CF	–	1%	0	–	0	5%	–	0	10%	5%
C % CF	0	2%	1%	2%	1%	1%	1%	0	10%	5%
Stoniness	SL	0	0	0	0	SL	SL	SL	SL	SL
Erosion	SL	SL	0	SL	0	0	0	0	SL	SL
Slope %	2	2	2	2	3	3	3	4	4	5
Slope Position	LOW	UP	UP	MID	CR	MID	LOW	LOW	UP	LOW
Landscape	LV	UN	UN	UN	UN	UN	UN	UN	HUM	HUM
A Text	SIL	SIL	SIL	SIL	SIL	SIL	SIL	SIL	L	L
B Text		SICL	SICL	–	SICL	SICL		SICL	CL	CL
C Text	SICL	SICL	SIC	SIC	SIC	SIC	SIC	SIC	CL	CL
Drainage Class	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL	WELL
UTM Zone										
UTM Northing										
UTM Easting										
LFH Thickness	0	0	0	0	0	0	0	0	0	0

UTN : 52

UNIT NAME	Unit #	Transect #	Township	Range	Direction	Surveyor	Date	Project	Interval Distance	Total Transect Length
ADY%	1	99	22	1	W5	RM	15·10·80	CALG	120	1200

SITE NUMBER	1	2	3	4	5	6	7	8	9	10
Unique Record No.	341	342	343	344	345	346	348	349	347	350
Sand % C	2.1	4.1	0.6	7.3	15.4	14.1	19.2	15.5	19.8	27.4
Silt % C	54.0	45.5	42.5	45.7	42.7	42.6	35.5	43.8	39.6	38.9
Clay % C	43.9	50.4	56.9	47.1	41.8	43.3	45.3	40.7	40.6	33.7
USDA Text	SIC	SIC	SIC	SIC	SIC	SIC	SIC	SIC	SIC	CL
UNIFIED Class	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL
Plastic Limit	20	21	23	23	20	24	20	19	19	17
Liquid Limit	37	37	45	39	34	41	37	32	33	28
Plasticity Index	17	16	22	16	14	17	17	13	14	11
Organic Carbon (A)	5.26	4.24	5.08	4.49	5.30	5.40	5.26	4.03	4.86	5.01
pH of C horizon	7.9	8.0	7.7	7.8	7.7	7.8	8.1	7.7	8.1	7.9
pH of A horizon	7.4	7.4	7.3	7.4	7.0	7.3	7.4	7.3	7.7	7.3
E.C. of C	0.75	0.5	1.0	0.55	0.5	0.75	6.6	0.4	1.05	0.5
Carbonate % A horizon	2.21	2.38	0.47	3.65	0.30	1.87		0.68	0.93	0.80
C horizon	41.83	33.95	31.10	29.57	28.68	16.43	19.49	23.21	22.78	19.05

Sample Lab Data Coding Sheet

APPENDIX 2

Complete Listing of Calgary Transect Raw Data File

UNIT ADY
U.NO 1
UTN 52
T.NO 99
TWP 22
R 1
DIR W
MER 5
TLEN 1200
INT 120
NOBS 10

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
341	EBO	MCON	REC	R	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	15	ND	ND	ND	0
342	RKV	LCON	REC	O	BL	CHER	LAC	FM	ND	TILL	FM	M	ND	12	ND	ND	7	19
343	RKV	LCON	REC	O	BL	CHER	LAC	FM	ND	TILL	FM	M	ND	32	ND	ND	23	55
344	EBO	MCON	REC	R	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	13	ND	ND	ND	0
345	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	20	ND	ND	19	39
346	ND	LCON	REC	CA	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	15	ND	ND	15	0
347	EBO	MCON	REC	R	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	16	ND	ND	ND	16
348	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	22	ND	ND	28	50
349	ADY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	12	ND	ND	18	30
350	ADY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	14	ND	ND	16	30

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
341	10YR	2	1	ND	ND	ND	10YR	6	3	ND	ND	ND	ND	ND	2	LOW	SIL	ND
342	10YR	2	1	10YR	4	3	10YR	5	3	W	M	PR	BM	2	2	UP	SIL	SICL
343	10YR	2	1	10YR	4	3	10YR	5	2	W	M	PR	BM	1	2	UP	SIL	SICL
344	10YR	2	1	ND	ND	ND	10YR	5	3	ND	ND	ND	ND	2	2	UP	SIL	ND
345	10YR	2	1	10YR	4	3	2.5Y	5	2	W	M	PR	BM	1	3	MID	SIL	SICL
346	10YR	2	1	10YR	4	3	2.5Y	5	2	W	M	PR	BMK	1	3	CR	SIL	SICL
347	10YR	2	1	ND	ND	ND	2.5Y	5	2	ND	ND	ND	ND	1	3	MID	SIL	ND
348	10YR	2	1	10YR	3	3	2.5Y	5	2	W	M	PR	BM	ND	4	LOW	SIL	SICL
349	10YR	2	1	10YR	3	3	10YR	5	3	M	M	PR	BM	10	4	UP	L	CL
350	10YR	2	1	10YR	3	3	10YR	5	2	M	M	PR	BM	5	5	LOW	L	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
341	EBO	2.1	54.0	43.9	SIC	CL	20.0	37.0	17.0	41.8	2.21	.8	7.4	7.9	5.26
342	RKV	4.1	45.5	50.4	SIC	CL	21.0	37.0	16.0	34.0	2.38	.5	7.4	8.0	4.24
343	RKV	.6	42.5	56.9	SIC	CL	23.0	45.0	22.0	31.1	.47	1.0	7.3	7.7	5.06
344	EBO	7.3	45.7	47.1	SIC	CL	23.0	39.0	16.0	29.6	3.65	.6	7.4	7.8	4.49
345	RKV	15.4	42.7	41.8	SIC	CL	20.0	34.0	14.0	28.7	.30	.5	7.0	7.7	5.30
346	ND	14.1	42.6	43.3	SIC	CL	24.0	41.0	17.0	16.4	1.87	.8	7.3	7.8	5.40
347	EBO	19.8	39.6	40.6	SIC	CL	19.0	33.0	14.0	22.6	.93	1.1	7.7	8.1	4.86
348	RKV	19.2	35.5	45.3	SIC	CL	20.0	37.0	17.0	19.5	ND	6.6	7.4	8.1	5.26
349	ADY	15.5	43.8	40.7	SIC	CL	19.0	32.0	13.0	23.2	.68	.4	7.3	7.7	4.03
350	ADY	27.4	38.9	33.7	CL	CL	17.0	28.0	11.0	19.1	.80	.5	7.3	7.9	4.54

UNIT ADY
U NO 1
UTN 54
T.NO 8
TWP 26
R 1
DIR W
MER 5
TLEN 1440
INT 120
NOBS 12

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
358	ADY	NCON	REC	O	BL	CHER	TILL	FM	M	ND	ND	ND	ND	9	ND	ND	20	29
359	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	14	ND	ND	12	26
360	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	22	ND	ND	11	33
361	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	15	ND	ND	10	25
362	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	16	ND	ND	14	30
363	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	14	ND	ND	24	38
364	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	15	ND	ND	30	45
365	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	16	ND	ND	19	35
366	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	13	ND	ND	20	33
367	SHL	LCON	REC	R	BL	CHER	TILL	FL	M	ND	ND	ND	ND	14	ND	ND	ND	0
368	ADY	NCON	REC	O	BL	CHER	TILL	FM	M	ND	ND	ND	ND	16	ND	ND	17	33
369	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FL	ND	ND	21	ND	ND	29	50

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF C	SLOP	SL P	ATEX	BTEX
358	10YR	2	1	10YR	4	3	10YR	5	3	W	M	PR	BM	5	2	MID	L	SICL
359	10YR	3	1	10YR	4	3	2.5Y	5	2	WM	M	PR	BM	3	3	UP	L	SIL
360	10YR	2	1	10YR	4	3	2.5Y	5	2	M	M	PR	BM	1	2	UP	L	SICL
361	10YR	2	1	10YR	3	3	2.5Y	6	2	M	M	PR	BM	ND	3	MID	CL	SICL
362	10YR	2	1	10YR	4	2	10YR	5	3	W	M	PR	BM	1	3	LOW	SICL	SICL
363	10YR	2	1	10YR	4	2	2.5Y	5	2	W	M	PR	BM	2	2	LOW	SICL	SICL
364	10YR	2	1	10YR	4	3	10YR	5	3	M	M	PR	BM	1	4	TOE	L	SICL
365	10YR	3	1	10YR	4	3	10YR	5	2	M	M	PR	BM	4	4	LOW	L	SICL
366	10YR	2	1	10YR	4	2	10YR	5	2	MS	M	PR	BM	4	4	UP	L	CL
367	10YR	3	1	ND	ND	ND	10YR	5	2	ND	ND	ND	ND	2	2	CR	L	ND
368	10YR	2	1	10YR	4	3	10YR	5	3	WM	M	PR	BM	4	4	CR	L	CL
369	10YR	2	1	10YR	4	3	10YR	5	2	M	M	PR	BM	2	4	LOW	L	L

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
358	ADY	20.0	43.4	36.6	SICL	CL	19.0	30.0	11.0	22.2	3.30	.4	7.2	7.7	2.65
359	RKV	9.0	50.3	40.7	SIC	CL	22.0	35.0	13.0	24.9	.21	.5	6.9	7.8	2.39
360	RKV	11.5	48.6	39.9	SICL	CL	18.0	31.0	13.0	21.4	3.83	.7	7.3	7.9	4.53
361	RKV	5.7	59.0	35.3	SICL	CL	21.0	35.0	14.0	26.4	1.02	.5	7.3	7.8	2.71
362	RKV	8.5	54.9	36.7	SICL	ML	24.0	36.0	12.0	29.4	3.74	.5	7.2	7.8	3.45
363	RKV	9.4	53.1	37.5	SICL	CL	23.0	36.0	13.0	21.9	.17	.5	6.7	7.7	2.71
364	RKV	30.4	41.3	28.3	CL	CL	17.0	25.0	8.0	16.9	2.47	.6	7.3	7.8	3.98
365	RKV	16.6	48.6	34.9	SICL	ML	24.0	35.0	11.0	27.4	.17	.5	6.5	7.8	3.57
366	RKV	16.4	48.1	35.5	SICL	ML	25.0	37.0	12.0	24.0	.26	.6	6.5	7.7	5.04
367	SHL	21.2	45.4	33.4	SICL	ML	29.0	43.0	14.0	20.1	2.72	.5	7.2	7.7	5.66
368	ADY	16.5	45.7	37.8	SICL	CL	21.0	34.0	13.0	23.1	2.55	.8	7.2	7.8	4.63
369	RKV	29.2	40.3	30.4	SICL	CL	21.0	34.0	13.0	22.8	.51	.7	7.1	7.6	5.01

UNIT ADY
U NO 1
UTN 55
T.NO 4
TWP 25
R 1
DIR W
MEP 5
TLEN 600
INT 120
NOBS 5

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
370	RKV	LCON	REC	0	BL	CHER	LG	FM	ND	TILL	FM	M	ND	15	ND	ND	17	32
371	ADY	NCON	REC	0	BL	CHER	TILL	FM	M	ND	ND	ND	ND	13	ND	ND	17	30
372	ADY	NCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	30	ND	ND	17	30
373	ADY	NCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	13	ND	ND	19	32
374	RKV	LCON	REC	0	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	34	ND	ND	26	60

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
370	10YR	3	1	10YR	4	3	10YR	5	3	MS	M	PR	BM	1	3	UP	L	L
371	10YR	3	1	10YR	4	3	10YR	5	3	ST	M	PR	BM	5	3	CR	L	L
372	10YR	2	1	10YR	4	3	10YR	5	3	MS	M	PR	BM	1	2	LOW	L	L
373	10YR	3	1	10YR	4	3	2.5Y	4	2	M	M	PR	BM	5	6	UP	L	L
374	10YR	2	1	10YR	4	3	2.5Y	5	2	MS	M	PR	BM	2	3	UP	L	SIL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
370	RKV	21.6	43.3	35.1	SICL	CL	21.0	33.0	12.0	30.1	.38	.8	7.1	7.7	5.32
371	ADY	19.3	48.0	32.7	SICL	CL	21.0	33.0	12.0	21.1	.55	.7	7.2	7.7	6.49
372	ADY	23.1	46.2	30.7	SICL	CL	19.0	29.0	10.0	14.3	.38	1.2	7.2	7.7	8.52
373	ADY	38.1	34.2	27.8	L	CL	19.0	29.0	10.0	22.2	.21	.6	7.0	7.6	5.52
374	RKV	21.1	43.9	35.0	SICL	CL	22.0	33.0	11.0	19.6	.55	.7	7.0	7.8	5.11

UNIT ADY
U NO 1
UTN 56
T.NO 49
TWP 25
R 1
DIR W
MER 5
TLEN 1340
INT 120
NOBS 11

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
375	RKV	LCON	REC	0	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	25	ND	ND	34	59
376	RKV	LCON	REC	0	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	15	ND	ND	50	65
377	ND	LCON	NREC	CA	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	18	ND	ND	10	0
378	RKV	LCON	REC	0	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	16	ND	ND	39	55
379	RKV	LCON	REC	0	BL	CHER	LAC	FM	ND	TILL	FM	M	ND	20	ND	ND	30	50
380	ADY	NCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	14	ND	ND	40	54
381	ADY	NCON	REC	0	BL	CHER	TILL	FM	M	ND	ND	ND	ND	15	ND	ND	29	44
382	SHL	LCON	REC	R	BL	CHER	TILL	FL	M	ND	ND	ND	ND	10	ND	ND	5	0
383	RKV	LCON	REC	0	BL	CHER	EOL	FM	M	TILL	FM	M	ND	16	ND	ND	44	60
384	ND	HCON	NREC	0	BL	CHER	FLU	FL	ND	ND	ND	ND	ND	110	ND	ND	ND	140
385	RKV	LCON	REC	0	BL	CHER	EOL	FM	ND	TILL	FM	M	ND	14	ND	ND	26	80

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF C	SLOP	SL P	ATEX	BTEX
375	10YR	2	1	10YR	4	3	10YR	5	2	M	M	PR	BM	1	3	MID	L	L
376	10YR	2	1	10YR	4	2	10YR	5	2	MS	M	PR	BM	1	2	UP	L	L
377	10YR	2	1	10YR	3	3	10YR	5	2	W	M	PR	BMK	5	3	LOW	L	L
378	10YR	2	1	10YR	5	4	10YR	5	2	M	M	PR	BM	3	2	UP	L	SIL
379	10YR	3	1	10YR	4	2	10YR	5	2	W	M	PR	BM	3	4	TOE	L	SIL
380	10YR	2	1	10YR	3	3	10YR	5	3	M	M	PR	BM	10	5	TOE	L	L
381	10YR	2	1	10YR	4	3	10YR	6	2	MS	M	PR	BM	10	3	UP	L	L
382	10YR	3	1	10YR	3	3	10YR	5	3	SL	ND	MASS	BMK	5	5	UP	L	SIL
383	10YR	2	1	10YR	3	3	10YR	5	3	M	M	PR	BM	ND	3	MID	L	L
384	10YR	2	1	10YR	4	2	ND	ND	ND	SL	ND	MASS	BM	5	9	TOE	L	CL
385	10YR	2	1	10YR	4	3	10YR	6	2	MS	MC	PR	BM	1	3	MID	L	L

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
375	RKV	16.4	46.7	34.8	SICL	CL	18.0	32.0	14.0	17.3	2.55	6.4	7.3	8.1	4.14
376	RKV	23.6	44.4	32.8	SICL	CL	18.0	29.0	11.0	17.0	.30	.5	7.0	7.9	4.39
377	ND	21.7	46.6	31.7	SICL	CL	18.0	27.0	9.0	22.6	.93	1.4	7.2	8.2	3.94
378	RKV	12.0	50.2	37.8	SICL	CL	22.0	36.0	14.0	23.2	.25	.5	7.1	7.8	4.06
379	RKV	12.4	51.7	35.9	SICL	CL	17.0	28.0	11.0	27.5	.34	11.0	7.2	8.4	5.01
380	ADY	32.7	39.3	28.0	L	CL	18.0	27.0	9.0	24.7	.38	.5	7.2	7.9	3.72
381	ADY	20.2	47.0	32.8	SICL	CL	19.0	30.0	11.0	23.9	3.74	.9	7.3	8.1	3.55
382	SHL	28.2	43.5	28.3	L	CL	20.0	31.0	11.0	24.7	.77	.6	7.2	7.9	3.61
383	RKV	13.4	53.8	32.8	SICL	CL	21.0	31.0	10.0	24.5	1.46	.7	7.3	7.7	3.35
384	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.41	ND	7.1	ND	4.38
385	RKV	15.3	51.7	33.0	SICL	CL	23.0	32.0	9.0	32.4	.30	ND	7.0	8.1	4.22

UNIT ADY
U.NO 1
UTN 74
T NO 1
TWP 25
R 29
DIR W
MER 4
TLEN 840
INT 120
NOBS 7

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1 S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B TH	LIME
514	ADY	NCON	REC	O	BL	CHER	TILL	FM	L	ND	ND	ND	ND	30	ND	ND	20	50
515	ND	MCON	NREC	R	BL	CHER	TILL	FM	L	ND	ND	ND	ND	25	ND	ND	ND	25
516	ND	LCON	REC	R	BL	CHER	TILL	FM	L	FG	MS	ND	ND	25	ND	ND	ND	25
517	ADY	NCON	REC	O	BL	CHER	TILL	FM	L	ND	ND	ND	ND	15	ND	ND	15	30
518	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FM	L	ND	15	ND	ND	30	45
519	SHL	LCON	REC	R	BL	CHER	TILL	FM	L	ND	ND	ND	ND	22	ND	ND	ND	22
520	ADY	NCON	REC	O	BL	CHER	TILL	FM	L	ND	ND	ND	ND	18	ND	ND	27	45

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
514	10YR	3	1	10YR	4	2	10YR	5	3	W	M	PR	BM	1	3	UP	L	SICL
515	10YR	3	1	ND	ND	ND	10YR	5	3	ND	ND	ND	ND	2	2	MID	L	ND
516	10YR	2	1	ND	ND	ND	10YR	5	3	ND	ND	ND	ND	1	3	MID	L	ND
517	10YR	3	2	10YR	4	4	10YR	6	2	W	M	PR	BM	1	2	MID	L	SICL
518	10YR	2	1	10YR	4	3	10YR	5	3	W	M	PR	BM	1	3	LOW	L	SICL
519	10YR	3	2	ND	ND	ND	10YR	5	2	ND	ND	ND	ND	2	3	UP	L	ND
520	10YR	3	1	10YR	4	4	10YR	6	2	W	M	PR	BM	8	2	LOW	L	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
514	ADY	30.3	37.2	32.4	CL	CL	20.0	29.0	9.0	15.0	ND	1 0	6 4	7.7	3.55
515	ND	15.5	47.3	37.3	SICL	CL	20.0	31.0	11.0	28.6	2.05	8	7 0	8.3	3.29
516	ND	17 4	47.6	35.0	SICL	CL	20.0	32.0	12.0	21.4	.60	.6	7.0	8.0	3.25
517	ADY	19.5	43.0	37.5	SICL	CL	22.0	35.0	13.0	26.5	85	.7	7 0	7.9	3 00
518	RKV	15 1	50.6	34.4	CL	CL	19.0	32.0	13.0	31.0	2.99	5	7.2	7.9	3.19
519	SHL	21.5	43.2	35.3	CL	CL	19.0	31.0	12 0	20.7	4 95	5 2	7 3	8.1	3.58
520	ADY	25.3	41.8	33.0	CL	CL	14.0	29.0	15.0	17.4	1.88	9	7.2	8.0	3.35

UNIT ATL
U NO 1
UTN 53
T.NO 164
TWP 22
R 1
DIR W
MER 5
TLEN 720
INT 120
NOBS 6

URN	SER	CON	STAT	SG	GG	ORD	P1 M	P1 T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE T	B.TH	LIME
351	ATL	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	38	ND	ND	22	60
352	ND	LCON	REC	R	BL	CHER	TILL	FL	M	ND	.ND	ND	ND	29	ND	ND	ND	29
353	ATL	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	20	ND	ND	20	40
354	ATL	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	13	ND	ND	27	40
355	ATL	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	14	ND	ND	31	45
356	ATL	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	40	ND	ND	50	90

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF C	SLOP	SL P	ATEX	BTEX
351	10YR	2	1	10YR	3	3	2 5Y	5	2	W	M	PR	BM	5	7	LOW	L	CL
352	10YR	2	1	ND	ND	ND	2 5Y	5	2	ND	ND	ND	ND	5	8	CR	L	ND
353	10YR	2	1	10YR	4	3	2 5Y	5	2	M	M	PR	BM	5	3	UP	L	CL
354	10YR	2	1	10YR	4	4	2 5Y	5	2	MS	M	PR	BM	10	6	UP	L	CL
355	10YR	2	1	10YR	4	3	10YR	5	2	MS	M	PR	BM	10	4	MID	L	CL
356	10YR	2	1	10YR	3	3	10YR	5	2	W	M	PR	BM	10	3	LOW	L	L

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
351	ATL	25 2	43.1	31.7	CL	CL	19 0	29.0	10 0	22.6	34	ND	6 8	7 7	7 35
352	ND	15 2	49 2	35.6	SICL	ML	27 0	39.0	12 0	17.2	1 02	ND	7 1	7 7	5 97
353	ATL	4 6	54 8	40.6	SIC	CL	23.0	36.0	13.0	17.0	1 27	ND	7 3	7 7	5 43
354	ATL	12 7	46 8	40.5	SIC	CL	22 0	34.0	12 0	17.0	21	ND	6 8	7 6	6 96
355	ATL	14 5	47 8	37 6	SICL	CL	20 0	34.0	14 0	15.7	34	ND	6 9	7 5	5 49
356	ATL	15 6	50 5	33.9	SICL	CL	20 0	31.0	11 0	15 1	25	ND	6 7	7 5	8 77

UNIT ATL
U NO 1
UTN 57
T NO 116
TWP 26
R 2
DIR W
MER 5
TLEN 840
INT 120
NOBS 7

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
386	ATL	NCON	REC	O	BL	CHER	TILL	FM	M	ND	ND	ND	ND	26	ND	ND	31	57
387	ATL	HCON	REC	C	BL	CHER	TILL	FM	M	ND	ND	ND	ND	12	ND	ND	13	25
388	ATL	LCON	REC	O	BL	CHER	TILL	FM	M	ND	ND	ND	ND	12	ND	ND	10	22
389	ATL	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	15	ND	ND	11	26
390	ATL	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	16	ND	ND	24	40
391	ND	MCON	REC	R	BL	CHER	TILL	FL	M	ND	ND	ND	ND	12	ND	ND	ND	12
392	ATL	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	16	ND	ND	44	60

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
386	10YR	2	1	10YR	4	3	10YR	5	2	MS	M	PR	BM	10	3	LOW	L	CL
387	10YR	2	1	10YR	5	4	10YR	6	2	WM	M	PR	BM	10	2	MID	L	L
388	10YR	2	1	10YR	4	3	10YR	5	2	M	M	PR	BM	15	3	MID	L	L
389	10YR	2	1	10YR	4	2	2.5Y	5	2	W	M	PR	BM	10	4	TOE	L	CL
390	10YR	2	1	10YR	4	3	2.5Y	5	2	M	M	PR	BM	15	2	UP	L	L
391	10YR	2	1	ND	ND	ND	2.5Y	5	2	ND	ND	ND	ND	10	2	LOW	L	ND
392	10YR	2	1	10YR	4	3	2.5Y	5	2	MS	M	PR	BM	5	3	LOW	L	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
386	ATL	16.9	46.9	36.2	SICL	CL	21.0	34.0	13.0	18.4	.26	.5	6.6	7.5	4.54
387	ATL	12.5	46.1	41.5	SIC	ML	25.0	39.0	14.0	26.1	ND	.6	6.4	7.8	4 69
388	ATL	25.0	37.4	37.5	SICL	ML	26.0	36.0	10.0	33.9	ND	.8	5.9	7.7	5 04
389	ATL	10.4	49.0	40.6	SIC	CL	23.0	37.0	14.0	27.4	.77	.7	6.8	7.9	5 54
390	ATL	21.9	44.7	33.4	CL	CL	21.0	31.0	10.0	22.7	ND	.4	6.2	7.7	3.37
391	ND	8.2	49.1	42.7	SIC	CL	22.0	36.0	14.0	27.4	1.72	.5	7.0	8 1	3.61
392	ATL	16.7	44.6	38.6	SICL	CL	20.0	29.0	9.0	18.2	ND	.6	6.0	7.6	7.85

UNIT ATL
U.NO 1
UTN 58
T NO 18
TWP 26
R 4
DIR W
MER 5
TLEN 840
INT 120
NOBS 7

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
393	ATL	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	12	ND	ND	18	30
394	ATL	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	12	ND	ND	18	30
395	ATL	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	17	ND	ND	38	55
396	ATL	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	16	ND	ND	34	50
397	ATL	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	15	ND	ND	31	46
398	ND	MCON	NREC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	15	ND	ND	25	40
399	ATL	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	19	ND	ND	31	50

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
393	10YR	2	1	10YR	4	2	10YR	5	2	M	M	PR	BM	10	3	LOW	L	CL
394	10YR	3	1	10YR	4	3	2.5Y	5	2	M	M	PR	BM	20	6	UP	L	CL
395	10YR	2	1	10YR	4	3	2.5Y	5	2	M	M	PR	BM	15	2	CR	L	CL
396	10YR	2	1	10YR	4	3	2.5Y	5	2	M	M	PR	BM	10	3	TOE	L	CL
397	10YR	2	1	10YR	4	3	2.5Y	5	2	M	M	PR	BM	10	4	MID	L	CL
398	10YR	2	1	10YR	4	3	2.5Y	5	2	W	M	PR	BM	20	2	LOW	L	CL
399	10YR	3	1	10YR	4	3	2.5Y	5	2	W	M	PR	BM	15	7	UP	L	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
393	ATL	7.6	48.7	43.7	SIC	CL	22.0	35.0	13.0	21.0	ND	.4	6.0	7.6	4 46
394	ATL	12.7	43.3	44.0	SIC	ML	26.0	39.0	13.0	19.3	ND	.4	6.0	7.6	4 00
395	ATL	9.9	43.5	46.5	SIC	CL	25.0	41.0	16.0	11.2	ND	.4	5.9	7.4	6 72
396	ATL	5.2	39.9	54.9	SIC	CL	24.0	45.0	21.0	16.4	ND	.6	5.8	7 6	6 96
397	ATL	15.0	43.8	41.2	SIC	CL	21.0	36.0	15.0	13.5	ND	.5	5.6	7.6	7 81
398	ND	14.3	45.2	40 5	SIC	CL	20 0	33.0	13.0	10.4	ND	.4	5.6	7.5	6 08
399	ATL	12.7	45.9	41 4	SIC	ML	29.0	45.0	16.0	12.0	.95	7	6.8	7.5	6 08

UNIT ATL
U.NO 1
UTN 59
T.NO 125
TWP 26
R 3
DIR W
MER 5
TLEN 840
INT 120
NOBS 7

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
400	ATL	NCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	30	ND	ND	40	70
401	ATL	NCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	30	ND	ND	37	67
402	ATL	LCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	14	ND	ND	41	55
403	ATL	NCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	16	ND	ND	30	47
404	ATL	NCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	15	ND	ND	26	41
405	ATL	NCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	17	ND	ND	31	48
406	ATL	NCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	16	ND	ND	29	45

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
400	10YR	2	1	10YR	4	3	2 5Y	5	2	MS	M	PR	BM	3	4	TOE	L	CL
401	10YR	2	1	10YR	4	3	10YR	5	2	M	M	PR	BM	10	6	LOW	L	CL
402	10YR	2	1	10YR	4	3	10YR	5	2	M	M	PR	BM	15	5	LOW	L	CL
403	10YR	2	1	10YR	4	3	10YR	5	2	M	M	PR	BM	15	3	UP	L	CL
404	10YR	2	1	10YR	4	3	10YR	5	2	MS	F	SAB	BM	15	2	MID	L	CL
405	10YR	2	1	10YR	4	3	10YR	5	2	MS	M	PR	BM	10	3	MID	L	CL
406	10YR	2	1	10YR	4	3	10YR	5	2	M	M	PR	BM	10	3	LOW	L	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
400	ATL	5.3	51.0	43.6	SIC	CL	18.0	33.0	15.0	19.2	ND	.4	6.1	7.5	6.58
401	ATL	.0	53.6	46.4	SIC	ML	26.0	42.0	16.0	9.7	ND	.6	5.8	7.2	6.28
402	ATL	6.9	45.8	47.3	SIC	CL	22.0	38.0	16.0	17.8	ND	.5	5.8	7.4	5.19
403	ATL	5.5	45.6	48.9	SIC	CL	25.0	41.0	16.0	17.3	ND	.4	6.1	7.5	5.69
404	ATL	9.8	44.1	46.1	SIC	CL	23.0	42.0	19.0	16.1	ND	.5	5.5	7.4	5.88
405	ATL	13.2	45.2	41.6	SIC	CL	22.0	36.0	14.0	17.3	ND	.5	5.8	7.5	7.36
406	ATL	15.2	44.6	40.2	SIC	CL	20.0	35.0	15.0	16.3	ND	.5	5.7	7.6	5.64

UNIT ATL
U.NO 1
UTN 60
T NO 175
TWP 22
R 2
DIR W
MER 5
TLEN 1200
INT 120
NOBS 10

URN	SER	CON	STAT	SG	GG	ORD	P1 M	P1 T	P1.S	P2 M	P2 T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
407	ATL	NCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	20	ND	ND	60	80
408	ATL	NCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	18	ND	ND	34	52
409	ATL	NCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	26	ND	ND	34	60
410	ATL	NCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	18	ND	ND	22	40
411	ATL	NCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	22	ND	ND	21	43
412	ATL	NCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	15	ND	ND	22	37
413	ATL	NCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	23	ND	ND	47	70
414	ATL	NCON	REC	0	BL	CHER	TILL	FL	M	ND	ND	ND	ND	28	ND	ND	32	60
415	ATL	NCON	REC	0	BL	CHER	TILL	FM	M	ND	ND	ND	ND	13	ND	ND	15	28
416	LLK	MCON	NREC	0	BL	CHER	LG	FM	ND	ND	ND	ND	ND	19	ND	ND	31	50

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
407	10YR	2	1	10YR	4	3	2 5Y	5	2	MS	F	SAB	BM	10	5	TOE	L	CL
408	10YR	2	1	10YR	4	3	2 5Y	5	2	MS	M	PR	BM	10	8	UP	L	CL
409	10YR	2	1	10YR	4	3	2 5Y	5	2	M	M	PR	BM	5	5	UP	L	CL
410	10YR	2	1	10YR	4	3	2 5Y	5	2	M	M	PR	BM	5	6	MID	L	CL
411	10YR	2	1	10YR	3	3	2 5Y	5	2	W	M	PR	BM	5	3	MID	L	L
412	10YR	2	1	10YR	4	2	2 5Y	5	2	W	M	PR	BM	10	9	UP	L	L
413	10YR	2	1	10YR	5	3	2 5Y	5	2	M	M	PR	BM	5	7	MID	L	L
414	10YR	2	1	10YR	4	3	2 5Y	5	2	M	F	SAB	BM	5	8	MID	L	CL
415	10YR	2	1	10YR	3	3	2 5Y	6	2	W	M	PR	BM	3	10	UP	L	CL
416	10YR	2	1	10YR	5	3	2 5Y	6	2	W	M	PR	BM	ND	7	LOW	L	SIC

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
407	ATL	18.0	47.4	34.6	SICL	CL	19.0	30.0	11.0	10.4	ND	.5	5.9	7.5	7.98
408	ATL	11.3	47.4	41.3	SICL	CL	22.0	36.0	14.0	18.3	ND	.4	6.3	7.7	5.84
409	ATL	14.7	49.9	35.3	SICL	CL	19.0	34.0	15.0	10.6	ND	.5	6.4	7.6	6.21
410	ATL	18.2	48.3	33.5	SICL	CL	21.0	32.0	11.0	18.9	ND	.4	6.4	7.7	6.16
411	ATL	15.0	52.6	32.4	SICL	CL	23.0	33.0	10.0	21.3	ND	.5	6.2	7.6	7.57
412	ATL	13.8	47.4	38.8	SICL	CL	23.0	37.0	14.0	21.3	ND	.4	6.1	7.7	5.37
413	ATL	13.7	38.7	47.7	SIC	CL	18.0	32.0	14.0	14.4	ND	.4	6.4	7.6	5.50
414	ATL	6.2	47.4	46.4	SIC	CL	23.0	38.0	15.0	19.7	.69	.4	6.8	7.7	4.64
415	ATL	16.5	46.4	37.1	SICL	CL	20.0	32.0	12.0	18.2	.43	.4	6.9	7.7	4.65
416	LLK	.0	32.9	67.1	HC	CH	27.0	52.0	25.0	23.4	1.81	.5	7.0	7.5	4.97

UNIT DEL
U.NO 1
UTN 66
T.NO 1
TWP 26
R 28
DIR W
MER 4
TLEN 960
INT 120
NOBS 8

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
453	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	20	ND	ND	37	57
454	ND	MCON	NREC	SZ	BL	CHER	EOL	FS	ND	TILL	FL	L	ND	20	10	ND	35	65
455	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	21	ND	ND	35	56
456	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	23	ND	ND	32	55
457	ND	MCON	NREC	E	BL	CHER	EOL	FM	ND	ND	ND	ND	ND	20	5	ND	37	62
458	ND	MCON	NREC	E	BL	CHER	EOL	FM	ND	TILL	FM	L	ND	14	6	ND	30	50
459	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	20	ND	ND	40	60
460	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	18	ND	ND	62	80

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
453	10YR	2	1	10YR	4	3	10YR	5	2	MS	M	PR	BM	2	3	MID	L	L
454	10YR	2	1	10YR	5	4	10YR	5	2	ST	M	PR	BM	1	2	UP	L	L
455	10YR	2	1	10YR	4	3	10YR	5	2	ST	M	PR	BM	5	2	CR	L	L
456	10YR	2	1	10YR	4	3	10YR	5	2	ST	MC	PR	BM	5	2	UP	L	CL
457	10YR	2	1	10YR	4	3	2.5Y	6	2	ST	MC	PR	BM	1	1	DEP	L	L
458	10YR	2	1	10YR	4	2	2.5Y	6	2	MS	MC	PR	BM	10	2	TOE	L	L
459	10YR	2	1	10YR	4	3	10YR	5	2	M	M	PR	BM	10	2	LOW	L	CL
460	10YR	2	1	10YR	4	3	10YR	5	2	MS	MC	PR	BM	8	4	LOW	L	L

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
453	DEL	24.6	37.7	37.7	CL	CL	23.0	37.0	14.0	18.4	ND	.7	5.8	7.7	4.70
454	ND	35.3	35.1	29.6	CL	CL	17.0	26.0	9.0	16.2	ND	.6	5.4	7.6	5.93
455	DEL	24.3	36.1	39.6	CL	CL	20.0	38.0	18.0	11.7	ND	.7	5.4	7.6	6.36
456	DEL	33.8	32.9	33.4	CL	CL	18.0	32.0	14.0	10.0	ND	.7	5.1	7.6	6.27
457	ND	17.0	44.4	38.5	SICL	CL	20.0	32.0	12.0	29.3	ND	2.3	5.5	7.9	5.82
458	ND	27.8	38.6	33.6	CL	CL	20.0	31.0	11.0	28.2	ND	2.3	5.5	8.2	6.05
459	DEL	31.5	29.1	39.4	CL	CL	20.0	34.0	14.0	9.6	ND	.6	5.3	7.7	6.75
460	DEL	26.7	38.1	35.2	CL	CL	17.0	30.0	13.0	7 5	ND	.6	5.5	7.7	7.67

UNIT DEL
U.NO 1
UTN 67
T.NO 2
TWP 25
R 28
DIR W
MER 4
TLEN 1120
INT 160
NOBS 7

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
461	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	14	ND	ND	13	27
462	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	13	ND	ND	23	36
463	ND	MCON	NREC	R	BL	CHER	TILL	FL	L	ND	ND	ND	ND	15	10	ND	ND	15
464	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	15	ND	ND	53	68
465	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	13	ND	ND	30	43
466	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	14	ND	ND	34	43
467	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	15	ND	ND	30	45

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
461	10YR	3	1	10YR	4	3	2.5Y	5	2	WM	M	PR	BM	3	1	ND	L	CL
462	10YR	3	1	10YR	3	3	10YR	5	2	W	M	PR	BM	3	1	UP	L	CL
463	10YR	2	1	ND	ND	ND	10YR	5	2	ND	ND	ND	ND	2	1	DEP	L	ND
464	10YR	3	1	10YR	4	3	10YR	5	2	M	MC	PR	BM	3	2	UP	L	CL
465	10YR	3	1	10YR	4	3	2.5Y	5	2	M	M	PR	BM	3	2	UP	L	CL
466	10YR	3	1	10YR	4	3	2.5Y	5	2	M	MC	PR	BM	5	2	UP	L	CL
467	10YR	3	1	10YR	4	3	10YR	5	2	W	M	PR	BM	8	3	CR	L	L

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
461	DEL	26.7	30.5	42.7	C.	CL	20.0	37.0	17.0	15.6	ND	.6	6.3	7.8	3.33
462	DEL	31.7	29.6	38 7	CL	CL	18.0	32.0	14.0	13.7	ND	.5	6.1	7 8	3 16
463	ND	26.3	38.1	35.6	CL	CL	19.0	35.0	16.0	9 2	ND	.4	6.3	7.6	3.99
464	DEL	30.7	31.2	38.2	CL	CL	16.0	34.0	18.0	6.8	ND	.7	5.6	7.7	3.36
465	DEL	31.5	29.3	39.3	CL	CL	17.0	31.0	14.0	12.3	ND	2.6	5.5	7.7	3.81
466	DEL	35.2	25.5	39.3	CL	CL	19.0	35.0	16.0	8.3	ND	4.9	5.4	7.7	4.29
467	DEL	20 5	34.4	45 1	C.	CL	22.0	38.0	16.0	13.2	ND	.8	5.0	7.6	5.97

UNIT DEL
U.NO 1
UTN 68
T.NO 3
TWP 23
R 28
DIR W
MER 4
TLEN 840
INT 120
NOBS 7

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
468	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	14	ND	ND	11	25
469	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	15	ND	ND	37	52
470	RKV	LCON	NREC	O	BL	CHER	EOL	FM	ND	TILL	FL	L	ND	16	ND	ND	23	35
471	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	16	ND	ND	27	43
472	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	21	ND	ND	19	40
473	ND	MCON	NREC	O	BL	CHER	TILL	FL	L	FG	CS	ND	ND	24	ND	ND	33	57
474	ND	MCON	REC	GL	BL	CHER	FLU	FL	ND	TILL	FL	L	ND	52	ND	ND	48	100

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
468	10YR	2	1	10YR	4	2	2.5Y	5	2	WM	M	PR	BM	3	4	LOW	L	CL
469	10YR	2	1	10YR	4	3	2.5Y	5	2	M	M	PR	BM	5	4	UP	L	CL
470	10YR	2	1	10YR	4	3	10YR	5	3	M	M	PR	BM	1	3	MID	L	SICL
471	10YR	2	1	10YR	4	3	2.5Y	5	2	MS	M	PR	BM	3	3	LOW	L	CL
472	10YR	2	1	10YR	4	3	2.5Y	5	2	MS	M	PR	BM	3	3	MID	L	CL
473	10YR	2	1	10YR	4	4	10YR	5	3	WM	M	PR	BM	5	2	LOW	L	CL
474	10YR	2	1	10YR	4	3	10YR	5	3	SL	ND	MASS	BG	5	1	TOE	CL	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
468	DEL	26.9	32.8	40.3	C.	CL	18.0	34.0	16.0	13.4	ND	.5	5.6	7.9	5.22
469	DEL	26.4	33.5	40.1	CL	CL	18.0	32.0	14.0	9.1	ND	.5	5.8	7.8	4.46
470	RKV	9.3	57.0	33.7	SICL	CL	20.0	31.0	11.0	22.7	ND	.5	5.5	7.7	3.89
471	DEL	23.9	34.0	42.1	CL	CL	21.0	37.0	16.0	14.2	.72	.9	6.5	8.0	5.24
472	DEL	33.5	29.6	36.9	CL	CL	20.0	37.0	17.0	11.2	ND	.6	6.2	7.9	4.32
473	ND	71.8	9.3	18.9	SL	SC	NP	NL	ND-	5.4	ND	.6	5.9	7.7	4.54
474	ND	23.2	37.8	39.0	CL	CL	16.0	33.0	17.0	5.6	.77	.6	6.6	7.5	4.24

UNIT DEL
U NO 1
UTN 69
T NO 4
TWP 22
R 28
DIR W
MER 4
TLEN 72C
INT 120
NOBS 6

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
475	ND	LCON	REC	R	BL	CHER	TILL	FL	L	ND	ND	ND	ND	16	ND	ND	ND	16
476	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	16	ND	ND	24	40
477	ND	LCON	REC	R	BL	CHER	TILL	FL	L	ND	ND	ND	ND	14	ND	ND	ND	14
478	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	14	ND	ND	19	33
479	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	13	ND	ND	20	33
480	DEL	NCON	REC	C	BL	CHER	TILL	FL	L	ND	ND	ND	ND	14	ND	ND	36	50

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
475	10YR	2	1	ND	ND	ND	10YR	5	2	ND	ND	ND	ND	3	5	CR	L	ND
476	10YR	2	1	10YR	4	3	10YR	5	2	M	M	PR	BM	3	3	MID	L	CL
477	10YR	2	1	ND	ND	ND	10YR	5	3	ND	ND	ND	ND	2	5	CR	L	ND
478	10YR	2	1	10YR	4	3	10YR	5	2	M	M	PR	BM	3	2	LOW	L	CL
479	10YR	2	1	10YR	4	4	10YR	5	2	M	M	PR	BM	3	6	UP	L	CL
480	10YR	3	1	10YR	3	3	10YR	5	2	W	M	PR	BM	5	3	MID	L	L

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
475	ND	27.8	32.8	39.4	CL	CL	24.0	39.0	15.0	7.1	.51	.5	6.7	7.8	3.33
476	DEL	25.1	38.6	36.3	CL	CL	18.0	31.0	13.0	11.6	ND	.5	5.1	7.6	3.93
477	ND	22.6	40.4	37.0	CL	CL	22.0	36.0	14.0	9.0	ND	.7	6.0	7.8	4.03
478	DEL	21.8	33.9	44.3	CL	CL	19.0	35.0	16.0	19.1	ND	.8	5.8	8.1	4.47
479	DEL	15.6	46.0	38.4	SICL	CL	23.0	37.0	14.0	12.2	ND	.5	5.2	7.7	3.66
480	DEL	28.9	34.4	35.7	CL	CL	20.0	34.0	14.0	12.0	ND	.5	5.2	7.6	3.73

UNIT DEL
U.NO 1
UTN 70
T.NO 5
TWP 23
R 28
DIR W
MER 4
TLEN 1080
INT 120
NOBS 9

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1 T	P1 S	P2.M	P2.T	P2.S	LFHT	AH T	AHET	AE T	B TH	LIME
481	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	20	ND	ND	30	50
482	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	23	ND	ND	36	59
483	ND	MCON	REC	O	HG	GLEY	EOL	FM	ND	TILL	FL	L	ND	22	ND	ND	18	40
484	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	17	ND	ND	31	46
485	ND	LCON	REC	GL	BL	CHER	TILL	FL	L	ND	ND	ND	ND	23	ND	ND	27	50
486	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	16	ND	ND	34	50
487	RKV	LCON	NREC	O	BL	CHER	EOL	FM	ND	TILL	FL	L	ND	16	ND	ND	26	42
488	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	14	ND	ND	18	32
489	RKV	LCON	NREC	O	BL	CHER	EOL	FM	ND	TILL	FL	L	ND	20	ND	ND	28	48

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
481	10YR	2	1	10YR	3	3	2.5Y	4	2	MS	M	PR	BM	3	2	MID	L	CL
482	10YR	2	1	10YR	4	3	2.5Y	5	2	MS	MC	PR	BM	3	1	MID	L	SICL
483	10YR	2	1	10YR	4	2	2 5Y	5	2	W	M	PR	BG	1	1	LOW	L	SICL
484	10YR	2	1	10YR	3	3	2 5Y	5	2	M	M	PR	BM	5	2	MID	L	CL
485	10YR	2	1	10YR	4	2	2.5Y	5	2	WM	M	PR	BM	3	2	LOW	L	CL
486	10YR	2	1	10YR	4	2	2.5Y	5	2	M	M	PR	BM	3	3	UP	L	CL
487	10YR	2	1	10YR	4	3	2 5Y	5	2	M	M	PR	BM	2	3	UP	L	SICL
488	10YR	2	1	10YR	4	3	2 5Y	5	2	M	M	PR	BM	3	3	CR	L	SICL
489	10YR	2	1	10YR	4	2	10YR	5	2	WM	M	PR	BM	ND	2	UP	L	SICL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	AC03	EC	PHA	PHC	CARB
481	DEL	26.2	33 1	40.6	CL	CL	19 0	36 0	17 0	8 1	ND	5	5.1	7.7	3.99
482	DEL	20.0	35.7	44.3	C	CL	18 0	36.0	18 0	11.7	ND	.8	5.4	7.8	4.45
483	ND	14.9	50.7	34.4	SICL	CL	18.0	31.0	13 0	17.9	ND	ND	5.5	7.7	4.79
484	DEL	23.9	34.7	41.4	CL	CL	18 0	35.0	17 0	11 5	ND	8	5.4	7.8	4.10
485	ND	19.6	42.6	37.8	SICL	CL	19 0	34 0	15 0	14 1	ND	4.5	5.7	7.8	4.25
486	DEL	22.6	33.3	44.1	C	CL	18 0	35.0	17 0	12.6	ND	5	5 2	7 7	3.22
487	RKV	21.4	40.3	38.3	CL	CL	19 0	34 0	15 0	17.2	ND	.5	5.4	7.7	3.43
488	DEL	26.5	33.1	40 4	C	CL	21.0	38.0	17 0	12.3	ND	.5	5.2	7.7	2 98
489	RKV	11.5	52.4	36.2	SICL	CL	21 0	33 0	12 0	22 1	ND	5	5.0	7.7	3.26

UNIT DEL
U NO 1
UTN 72
T.NO 6
TWP 21
R 28
DIR W
MER 4
TLEN 720
INT 120
NOBS 6

URN	SER	CON	STAT	SG	GG	ORD	P1 M	P1 T	P1.S	P2.M	P2 T	P2 S	LFHT	AH T	AHET	AE T	B.TH	LIME
501	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	13	ND	ND	30	43
502	ND	MCON	NREC	O	BL	CHER	EOL	FM	ND	FG	CS	ND	ND	14	ND	ND	24	36
503	RKV	LCON	NREC	O	BL	CHER	EOL	FM	ND	TILL	FL	L	ND	18	ND	ND	29	47
504	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	17	ND	ND	31	48
505	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	13	ND	ND	27	41
506	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FL	L	ND	16	ND	ND	35	51

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF C	SLOP	SL.P	ATEX	BTEX
501	10YR	3	1	10YR	4	3	2 5Y	5	2	MS	M	PR	BM	5	2	UP	L	CL
502	10YR	3	1	10YR	4	3	2 5Y	5	2	M	M	PR	BM	ND	2	MID	L	SICL
503	10YR	2	1	10YR	4	3	10YR	5	3	M	M	PR	BM	ND	2	UP	L	SICL
504	10YR	2	1	10YR	4	3	10YR	5	2	M	M	PR	BM	3	1	ND	L	CL
505	10YR	3	2	10YR	4	3	10YR	5	2	MS	M	PR	BM	3	4	UP	L	CL
506	10YR	3	2	10YR	4	3	10YR	5	2	M	M	PR	BM	ND	3	TOE	L	SICL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	AC03	EC	PHA	PHC	CARB
501	DEL	21.8	35 2	43.1	C	CL	22 0	41 0	19 0	10 6	ND	.5	5.1	7.7	4 79
502	ND	36.0	36 8	27 2	L	CL	21 0	29 0	8 0	25.6	ND	6	5.1	7.7	5.27
503	RKV	30.9	37 7	31.4	CL	CL	19 0	29 0	10 0	21 1	ND	5	5.1	7.7	4.06
504	DEL	28.1	33 2	38.7	CL	CL	20 0	33.0	13 0	19.6	ND	5	5.2	7.8	5 54
505	DEL	24.7	34 0	41 3	C.	CL	20 0	37 0	17 0	17 0	ND	6	5.2	7.8	3.93
506	RKV	7.8	54 9	37 2	SICL	CL	21 0	34.0	13 0	24 3	ND	1 5	5.1	7.8	5.38

UNIT DERK
U NO 1
UTN 71
T NO 1
TWP 22
R 28
DIR W
MER 4
TLEN 1600
INT 160
NOBS 11

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
490	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	16	ND	ND	30	46
491	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FL	L	ND	20	ND	ND	30	50
492	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	25	ND	ND	40	65
493	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	23	ND	ND	30	53
494	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	14	ND	ND	16	30
495	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	16	ND	ND	38	54
496	EBO	LCON	REC	R	BL	CHER	EOL	FM	ND	TILL	FL	L	ND	17	ND	ND	ND	17
497	DEL	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	23	ND	ND	40	63
498	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FL	L	ND	18	ND	ND	22	40
499	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FL	L	ND	16	ND	ND	34	50
500	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FL	L	ND	21	ND	ND	29	50

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL P	ATEX	BTEX
490	10YR	2	1	10YR	3	3	2.5Y	5	2	M	M	PR	BM	3	2	ND	L	SICL
491	10YR	2	1	10YR	4	3	2.5Y	5	2	M	M	PR	BM	ND	2	UP	L	SICL
492	10YR	2	1	10YR	4	3	2.5Y	5	3	M	M	PR	BM	2	2	TOE	L	SICL
493	10YR	2	1	10YR	4	3	2.5Y	5	2	MS	M	PR	BM	3	2	ND	L	SICL
494	10YR	2	1	10YR	3	3	2.5Y	5	2	MS	M	PR	BM	2	2	UP	L	SICL
495	10YR	2	1	10YR	4	3	2.5Y	5	2	WM	M	PR	BM	3	2	MID	L	SICL
496	10YR	2	1	ND	ND	ND	2.5Y	5	2	ND	ND	ND	ND	ND	3	CR	L	ND
497	10YR	2	1	10YR	3	3	2.5Y	5	2	M	M	PR	BM	3	2	ND	L	SICL
498	10YR	2	1	10YR	4	3	2.5Y	5	2	M	M	PR	BM	ND	2	UP	L	SICL
499	10YR	2	1	10YR	4	4	2.5Y	5	2	M	M	PR	BM	1	2	LOW	L	SICL
500	10YR	2	1	10YR	4	2	2.5Y	5	2	W	M	PR	BM	ND	2	LOW	L	SICL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
490	DEL	23.8	34.4	41.8	C.	CL	19.0	37.0	18.0	14.8	ND	.7	5.3	8.1	4.62
491	RKV	20.7	44.5	34.9	SICL	CL	21.0	36.0	15.0	15.1	ND	.5	5.4	7.6	3.81
492	DEL	24.3	32.1	43.6	C.	CL	19.0	40.0	21.0	11.2	ND	.6	5.1	7.8	5.28
493	DEL	28.3	32.6	39.2	CL	CL	19.0	36.0	17.0	12.9	ND	4.4	5.7	7.9	5.97
494	DEL	23.5	37.5	39.0	CL	CL	21.0	38.0	17.0	14.3	ND	.6	5.0	7.6	4.35
495	DEL	27.1	33.5	39.4	CL	CL	19.0	33.0	14.0	13.4	ND	.6	5.0	7.7	3.50
496	EBO	17.1	43.0	40.0	SICL	CL	22.0	37.0	15.0	18.7	ND	.5	5.7	7.6	4.82
497	DEL	24.7	34.1	41.2	C.	CL	17.0	36.0	19.0	10.6	ND	4.2	4.8	7.7	5.26
498	RKV	21.4	40.0	38.5	SICL	CL	21.0	36.0	15.0	11.4	ND	.5	5.2	7.5	4.53
499	RKV	19.3	47.3	33.4	SICL	CL	21.0	37.0	16.0	11.2	ND	.5	5.0	7.6	4.30
500	RKV	15.2	50.6	34.3	SICL	CL	19.0	35.0	16.0	8.8	ND	.9	5.0	7.5	4.02

UNIT DVG
U NO 1
UTN 11
T NO 19
TWP 25
R 4
DIR W
MER 5
TLEN 1440
INT 120
NOBS 12

URN	SER	CON	STAT	SG	GG	ORD	P1 M	P1 T	P1 S	P2.M	P2 T	P2 S	LFHT	AH T	AHET	AE T	B TH	LIME
57	DVG	NCON	REC	O	BL	CHER	TILL	FL	C	ND	ND	ND	ND	18	ND	ND	32	50
58	ND	LCON	NREC	O	BL	CHER	LG	FC	ND	TILL	FC	C	ND	17	ND	ND	35	52
59	DVG	NCON	REC	O	BL	CHER	TILL	FL	C	ND	ND	ND	ND	14	ND	ND	36	50
60	DVG	NCON	REC	O	BL	CHER	TILL	FL	C	ND	ND	ND	ND	20	ND	ND	20	40
61	DVG	NCON	REC	O	BL	CHER	TILL	FL	C	ND	ND	ND	ND	19	ND	ND	36	55
62	DVG	NCON	REC	O	BL	CHEP	TILL	FL	C	ND	ND	ND	ND	17	ND	ND	43	60
63	DVG	NCON	REC	O	BL	CHER	TILL	FL	C	ND	ND	ND	ND	20	ND	ND	35	55
64	DVG	NCON	REC	O	BL	CHER	TILL	FL	C	ND	ND	ND	ND	13	ND	ND	37	50
65	DVG	NCON	REC	O	BL	CHER	TILL	FL	C	ND	ND	ND	ND	30	ND	ND	65	95
66	ND	LCON	REC	E	BL	CHER	TILL	FL	C	ND	ND	ND	ND	25	ND	5	16	46
67	ND	LCON	REC	D	GL	LUV	TILL	FL	C	ND	ND	ND	ND	23	ND	27	40	90
68	ND	LCON	REC	E	BL	CHER	TILL	FL	C	ND	ND	ND	ND	23	ND	10	27	60

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF C	SLOP	SL P	ATEX	BTEX
57	10YR	2	1	10YR	3	3	2.5Y	5	2	M	F	SAB	BM	2	2	UP	L	C
58	10YR	2	1	10YR	3	3	2.5Y	5	2	WM	F	SAB	BM	2	6	CR	L	C
59	10YR	2	1	10YR	3	3	10YR	6	2	MS	F	SAB	BM	3	9	UP	L	CL
60	10YR	3	1	10YR	3	2	10YR	4	2	WM	F	SAB	BM	3	7	LOW	L	CL
61	10YR	2	1	10YR	3	3	10YR	6	3	MS	FM	SAB	BM	2	4	TOE	CL	C
62	10YR	3	2	10YR	3	3	10YR	5	2	MS	FM	SAB	BM	3	6	LOW	L	C
63	10YR	2	1	10YR	4	4	10YR	6	3	MS	FM	SAB	BM	5	6	LOW	L	CL
64	10YR	3	2	10YR	4	4	10YR	5	3	ST	FM	SAB	BM	5	5	LOW	L	CL
65	10YR	2	1	10YR	4	3	2.5Y	5	2	ST	FM	SAB	BM	5	3	TOE	L	CL
66	10YR	3	2	10YR	4	4	10YR	5	3	MS	FM	SAB	BM	5	7	MID	L	CL
67	10YR	3	1	10YR	4	3	2 5Y	5	2	MS	F	SAB	BT	5	7	UP	L	CL
68	10YR	2	1	10YR	4	4	2.5Y	5	4	ST	FM	SAB	BT	8	6	CR	L	CL

URN.	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
57	DVG	.0	42.4	57.6	SIC	CL	23.0	44.0	21.0	18.2	ND	ND	5.7	7.5	7.84
58	ND	.0	34.5	65.5	HC	CL	24.0	48.0	24.0	16.5	ND	ND	5.5	7.6	6.08
59	DVG	1.3	41.4	57.2	SIC	CL	24.0	46.0	22.0	18.7	ND	ND	5.9	7.5	6.62
60	DVG	2.8	43.0	54.2	SIC	CL	27.0	47.0	20.0	10.2	ND	ND	6.3	7.5	5.28
61	DVG	.0	39.4	60.6	HC	CL	26.0	46.0	20.0	14.0	ND	ND	5.7	7.5	7.24
62	DVG	3.1	40.7	56.2	SIC	CL	22.0	39.0	17.0	15.3	ND	ND	5.8	7.5	6.95
63	DVG	11.7	46.3	42.1	SIC	CL	19.0	36.0	17.0	14.7	ND	ND	5.4	7.5	7.22
64	DVG	6.6	40.3	53.0	SIC	CL	22.0	40.0	18.0	17.4	ND	ND	5.8	7.5	6.77
65	DVG	9.6	51.5	38.9	SICL	CL	18.0	31.0	13.0	16.1	ND	ND	5.7	7.5	6.54
66	ND	14.5	46.3	39.3	SICL	CL	19.0	34.0	15.0	15.7	ND	ND	5.5	7.5	6.60
67	ND	11.2	49.9	39.0	SICL	CL	17.0	30.0	13.0	13.2	ND	ND	6.3	7.5	3.47
68	ND	10.0	48.7	41.3	SIC	CL	20.0	35.0	15.0	13.6	ND	ND	5.9	7.4	7.09

UNIT DVG
U.NO 1
UTN 12
T.NO 15
TWP 25
R 4
DIR W
MER 4
TLEN 600
INT 120
NOBS 5

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
69	DVG	NCON	REC	0	BL	CHER	TILL	FL	C	ND	ND	ND	ND	19	ND	ND	31	50
70	FSH	MCON	NREC	0	BL	CHER	LG	FC	ND	ND	ND	ND	ND	22	ND	ND	28	50
71	DVG	NCON	REC	0	BL	CHER	TILL	FL	C	ND	ND	ND	ND	17	ND	ND	23	40
72	ND	MCON	NREC	0	BL	CHER	TILL	FL	C	RES	MS	ND	ND	14	ND	ND	36	50
73	DVG	NCON	REC	0	BL	CHER	TILL	FL	C	ND	ND	ND	ND	38	ND	ND	17	55

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
69	10YR	3	2	10YR	3	3	10YR	5	3	ST	FM	SAB	BM	5	11	LOW	L	CL
70	10YR	3	2	10YR	3	2	2.5Y	4	4	ST	FM	SAB	BM	1	13	MID	CL	C
71	10YR	3	2	10YR	4	4	10YR	4	2	MS	F	SAB	BM	5	9	CR	L	CL
72	10YR	3	1	10YR	4	4	10YR	5	3	WM	MC	PR	BM	5	9	UP	L	CL
73	10YR	2	1	10YR	4	2	10YR	4	2	M	F	SAB	BM	5	10	LOW	L	C

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	AC03	EC	PHA	PHC	CARB
69	DVG	2.0	42.6	55.4	SIC	CL	23.0	44.0	21.0	14.4	ND	ND	5.5	7.4	6.39
70	FSH	.0	20.1	79.9	HC	CH	30.0	56.0	26.0	17.0	4.49	ND	7.0	7.6	5.53
71	DVG	8.3	26.2	65.5	HC	CH	28.0	50.0	22.0	17.0	ND	ND	6.1	7.5	9.14
72	ND	26.4	52.7	20.9	SIL	ML	20.0	22.0	2.0	25.8	ND	ND	5.5	7.5	7.90
73	DVG	.0	30.4	69.6	HC	CH	27.0	51.0	24.0	13.5	ND	ND	5.8	7.5	7.78

UNIT DVG
U.NO 1
UTN 34
T.NO 64
TWP 21
R 3
DIR W
MER 4
TLEN 600
INT 120
NOBS 4

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
216	ND	MCON	NREC	E	BL	CHER	LG	FC	ND	TILL	FC	M	ND	24	ND	6	75	105
217	ND	MCON	NREC	0	BL	CHER	LG	FC	ND	TILL	FC	M	ND	12	ND	ND	62	74
218	ND	MCON	NREC	0	BL	CHER	LG	FC	ND	TILL	FC	M	ND	18	ND	ND	74	92
219	ND	MCON	NREC	0	BL	CHER	LG	FC	ND	TILL	FC	M	ND	16	ND	ND	56	72
220	ND	MCON	NREC	0	BL	CHER	LG	FC	ND	TILL	FC	M	ND	20	ND	ND	52	72

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
216	10YR	2	1	10YR	4	2	2.5Y	4	2	ST	FM	SAB	BT	10	10	LOW	C	HC
217	10YR	2	1	10YR	4	2	2.5Y	4	4	MS	FM	SAB	BM	5	8	CR	C	HC
218	10YR	2	1	10YR	4	2	2.5Y	5	2	MS	FM	SAB	BM	5	8	UP	CL	HC
219	10YR	2	1	10YR	4	3	2.5Y	5	2	MS	F	SAB	BM	2	8	MID	CL	HC
220	10YR	2	1	10YR	4	2	2.5Y	5	2	ST	FM	SAB	BM	2	11	LOW	C	HC

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	AC03	EC	PHA	PHC	CARB
216	ND	12.2	41.6	46.1	SIC	CL	25.0	39.0	14.0	3	ND	ND	5.4	6.3	6.40
217	ND	6.7	43.7	49.6	SIC	CL	20.0	39.0	19.0	15.1	ND	ND	5.2	7.6	5.87
218	ND	11.0	39.2	49.8	SIC	CL	19.0	36.0	17.0	6.7	ND	ND	5.2	7.6	5.73
219	ND	.1	29.2	70.7	HC	CL	25.0	47.0	22.0	12.6	ND	ND	5.1	7.6	6.24
220	ND	2.1	38.0	59.9	SIC	CL	24.0	44.0	20.0	8.9	ND	ND	5.3	7.5	7.38

UNIT DVG
U.NO 1
UTN 36
T.NO 29
TWP 25
R 4
DIR W
MER 5
TLEN 480
INT 120
NOBS 4

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
226	ND	MCON	NREC	O	BL	CHER	LG	FC	ND	TILL	FC	ND	ND	18	ND	ND	12	30
227	DVG	NCON	REC	O	BL	CHER	TILL	FL	ND	ND	ND	ND	ND	20	ND	ND	26	46
228	FSH	HCON	NREC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	18	ND	ND	26	44
229	FSH	HCON	NREC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	24	ND	ND	50	74

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
226	10YR	2	1	10YR	4	2	10YR	5	2	WM	F	SAB	BM	1	3	LOW	CL	C
227	10YR	2	1	10YR	4	3	2.5Y	5	2	M	M	PR	BM	2	3	MID	CL	C
228	10YR	2	1	10YR	4	2	2.5Y	5	2	M	FM	SAB	BM	ND	4	UP	CL	HC
229	10YR	2	1	10YR	4	2	2.5Y	5	2	M	FM	SAB	BM	ND	1	DEP	CL	HC

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
226	ND	1.3	41.9	56.7	SIC	CL	23.0	46.0	23.0	21.9	ND	ND	6.0	7.9	6.27
227	DVG	9.4	45.0	45.6	SIC	CL	19.0	35.0	16.0	23.4	ND	ND	5.8	7.8	6.30
228	FSH	.0	25.8	74.2	HC	CH	26.0	54.0	28.0	17.9	ND	ND	5.7	7.9	6.49
229	FSH	.9	42.4	56.7	SIC	CL	23.0	43.0	20.0	20.6	ND	ND	5.8	7.9	9.11

UNIT ELB
U.NO 2
UTN 2
T.NO 8
TWP 21
R 4
DIR W
MER 5
TLEN 500
INT 120
NOBS 4

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
6	ND	LCON	REC	D	GL	LUV	LG	FC	ND	ND	ND	ND	5	ND	10	8	42	60
7	POT	HCON	REC	O	G	GLEY	LG	FC	ND	ND	ND	ND	25	ND	5	ND	52	57
8	ND	LCON	REC	D	GL	LUV	LG	FC	ND	ND	ND	ND	15	ND	8	ND	30	38
9	RSN	LCON	NREC	D	GL	LUV	TILL	FC	C	ND	ND	ND	7	ND	ND	3	67	70

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
6	10YR	3	1	10YR	3	2	2.5Y	4	2	ST	F	SAB	BT	ND	2	LOW	C	HC
7	10YR	2	1	10YR	3	1	2.5Y	5	2	MS	FM	GRAN	BG	ND	3	LOW	C	HC
8	10YR	2	1	10YR	3	1	2.5Y	5	2	MS	FM	GRAN	BT	ND	4	MID	C	HC
9	10YR	4	2	10YR	3	1	2.5Y	4	2	M	F	SAB	BT	2	6	UP	C	HC

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
6	ND	.0	19.3	80.7	HC	CH	26.0	62.0	36.0	15.4	ND	ND	5.0	7.6	6.08
7	POT	.0	24.0	76.0	HC	CH	26.0	66.0	40.0	.4	ND	ND	5.8	7.2	34.52
8	ND	.0	24.3	75.7	HC	CH	33.0	68.0	35.0	.7	ND	ND	5.8	7.4	5.83
9	RSN	.0	28.2	71.8	HC	CH	25.0	60.0	35.0	12.4	ND	ND	ND	7.5	ND

UNIT ELB
U.NO 2
UTN 8
T.NO 17
TWP 21
R 4
DIR W
MER 5
TLEN 600
INT 120
NOBS 5

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
39	POT	MCON	REC	D	HG	GLEY	LG	FC	ND	ND	ND	ND	7	11	2	ND	62	75
40	POT	MCON	REC	D	HG	GLEY	LG	FC	ND	TILL	FL	C	5	17	ND	ND	51	65
41	POT	MCON	REC	D	HG	GLEY	LG	FC	ND	TILL	FC	C	3	18	ND	ND	27	45
42	ND	MCON	REC	D	DG	CHER	LG	FC	ND	TILL	FC	C	12	27	ND	ND	57	84
43	POT	MCON	REC	D	HG	GLEY	LG	FC	ND	ND	ND	ND	15	14	ND	ND	76	90

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
39	10YR	2	1	10YR	3	2	2.5Y	4	2	ST	FM	GRAN	BTG	ND	5	TOE	CL	HC
40	10YR	2	1	10YR	3	1	2.5Y	4	2	MS	M	GRAN	BTG	2	8	MID	SICL	C
41	10YR	2	1	10YR	4	1	10YR	4	1	MS	C	AB	BG	2	6	UP	C	HC
42	10YR	4	2	10YR	4	1	2.5Y	4	2	MS	F	SAB	BT	2	8	MID	SICL	HC
43	10YR	2	1	10YR	2	1	10YR	5	1	MS	FM	GRAN	BG	ND	4	MID	C	HC

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
39	POT	.0	23.2	76.8	HC	CH	29.0	63.0	34.0	3.2	ND	ND	6.1	7.3	5.83
40	POT	19.6	37.5	43.0	C.	CL	20.0	36.0	16.0	.2	ND	ND	5.2	6.1	6.70
41	POT	6.1	40.6	53.3	C.	CL	24.0	42.0	18.0	.0	ND	ND	ND	6.0	ND
42	ND	.0	33.8	66.2	HC	CH	24.0	58.0	32.0	1.3	ND	ND	5.7	7.5	7.39
43	POT	.0	25.8	74.2	HC	CH	27.0	63.0	36.0	.7	ND	ND	5.9	7.2	6.32

UNIT ELB
U NO 2
UTN 17
T.NO 10
TWP 22
R 4
DIR W
MER 5
TLEN 720
INT 120
NOBS 6

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
110	ELB	NCON	REC	D	GL	LUV	LG	FC	ND	TILL	FC	C	4	ND	ND	9	35	58
111	ND	LCON	REC	D	GL	LUV	LG	FC	ND	ND	ND	ND	3	ND	10	12	25	50
112	ND	LCON	REC	D	GL	LUV	LG	FC	ND	ND	ND	ND	ND	ND	12	8	30	50
113	ND	MCON	NREC	O	DG	CHER	LG	FC	ND	TILL	FC	C	ND	ND	13	ND	41	54
114	ND	MCON	NREC	O	DG	CHER	LG	FC	ND	TILL	FC	C	ND	10	5	ND	25	40
115	ND	LCON	REC	D	GL	LUV	LG	FC	ND	ND	ND	ND	ND	ND	8	10	30	48

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
110	10YR	6	3	10YR	5	2	10YR	5	3	ST	FM	SAB	BT	10	15	UP	L	HC
111	2 5Y	4	4	10YR	3	2	2 5Y	4	2	ST	M	SAB	BT	ND	15	MID	HC	HC
112	10YR	5	3	10YR	4	2	2 5Y	4	2	ST	F	SAB	BT	ND	20	CR	L	HC
113	10YR	3	2	10YR	4	2	2 5Y	5	2	ST	F	SAB	BT	2	25	CR	C	C
114	10YR	3	1	10YR	4	2	2 5Y	4	2	MS	F	SAB	BT	2	17	ND	CL	HC
115	10YR	3	2	10YR	4	2	2 5Y	5	2	M	FM	SAB	BT	ND	14	CR	SICL	C

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
110	ELB	3.6	54.5	41.9	SIC	CL	19.0	31.0	12.0	19.2	ND	ND	5.3	7.4	1.86
111	ND	.0	51.8	48.2	SIC	CL	20.0	37.0	17.0	29.3	ND	ND	5.5	7.6	2.79
112	ND	.0	42.4	57.6	SIC	CL	20.0	42.0	22.0	28.6	ND	ND	5.1	7.6	7 14
113	ND	.0	38.4	61.6	HC	CL	25 0	45.0	20.0	22.3	.93	ND	6.6	7.5	5.90
114	ND	.0	34.7	65.3	HC	CL	22.0	46.0	24.0	24.5	ND	ND	6.1	7.6	8.65
115	ND	.0	28.7	71.3	HC	CL	25.0	49.0	24.0	24.3	ND	ND	5.6	7.5	7.88

UNIT ELB
U.NO 2
UTN 33
T.NO 2
TWP 22
R 4
DIR W
MER 5
TLEN 600
INT 120
NOBS 5

URN	SER	CON	STAT	SG	GG	ORD	P1 M	P1.T	P1.S	P2.M	P2 T	P2.S	LFHT	AH T	AHET	AE T	B TH	LIME
211	ND	LCON	REC	D	GL	LUV	LG	FC	ND	ND	ND	ND	8	ND	12	13	31	56
212	ND	MCON	REC	D	GL	LUV	LG	FC	ND	ND	ND	ND	18	ND	11	8	67	86
213	POT	HCON	REC	D	HG	GLEY	LG	FC	ND	ND	ND	ND	ND	9	ND	ND	44	53
214	ELB	NCON	REC	C	GL	LUV	LG	FC	ND	ND	ND	ND	5	ND	ND	15	35	50
215	ND	MCON	NREC	D	DG	CHER	TILL	FL	C	ND	ND	ND	7	ND	12	ND	ND	44

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
211	10YR	3	2	10YR	4	1	10YR	4	2	ST	MC	AB	BT	1	3	CR	CL	HC
212	10YR	3	2	10YR	4	1	2.5Y	5	2	ST	F	SAB	BT	ND	1	DEP	SICL	HC
213	10YR	2	1	10YR	4	1	2.5Y	5	2	ST	FM	GRAN	BG	ND	1	DEP	HC	HC
214	10YR	5	3	10YR	4	2	10YR	4	2	ST	M	SAB	BT	ND	8	UP	L	HC
215	10YR	3	3	10YR	4	3	10YR	5	2	MS	FM	GRAN	BM	5	8	TOE	CL	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
211	ND	.0	38.2	61.8	HC	CL	25.0	47.0	19.0	6.0	ND	ND	5.3	7.4	6.37
212	ND	.0	25.0	75.0	HC	CH	24.0	55.0	31.0	18.6	ND	ND	5.7	7.6	4.18
213	POT	.0	23.5	76.5	HC	CH	26.0	54.0	28.0	25.5	ND	ND	6.2	7.7	6.62
214	ELB	7.1	33.8	59.0	SIC	CL	23.0	46.0	23.0	11.0	ND	ND	5.4	7.6	1.84
215	ND	20.0	37.8	42.1	C.	CL	17.0	33.0	16.0	14.7	ND	ND	6.1	7.6	1.49

UNIT FSH
U.NO 1
UTN 1
T.NO 54
TWP 21
R 3
DIR W
MER 5
TLEN 720
INT 120
NOBS 5

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1 T	P1.S	P2.M	P2 T	P2.S	LFHT	AH T	AHET	AE.T	B.TH	LIME
1	FSH	NCON	REC	D	BL	CHER	LG	FC	ND	ND	ND	ND	ND	26	ND	ND	47	73
2	FSH	NCON	REC	D	BL	CHER	LG	FC	ND	ND	ND	ND	ND	21	ND	ND	57	78
3	FSH	LCON	REC	E	BL	CHER	LG	FC	ND	ND	ND	ND	ND	19	5	10	32	66
4	ND	LCON	REC	E	BL	CHER	LG	FC	ND	TILL	FC	M	10	17	ND	10	33	60
5	ND	LCON	REC	E	BL	CHER	LG	FC	ND	TILL	FC	M	10	20	25	ND	17	62

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
1	10YR	2	1	10YR	4	2	2 5Y	5	2	ST	FM	SAB	BT	ND	4	CR	CL	HC
2	10YR	3	1	10YR	4	2	2 5Y	5	2	ST	FM	SAB	BT	ND	4	UP	CL	HC
3	10YR	2	1	10YR	4	2	2 5Y	4	2	ST	FM	SAB	BT	ND	2	LOW	CL	HC
4	10YR	2	1	10YR	4	2	2 5Y	5	3	ST	FM	SAB	BT	3	3	MID	L	HC
5	10YR	2	1	10YR	4	2	2 5Y	5	3	M	FM	SAB	BT	1	6	MID	CL	HC

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
1	FSH	0	18 5	81 5	HC	CH	27 0	60 0	33 0	16.5	ND	ND	5 6	7 7	7 82
2	FSH	.1	37 0	62.5	HC	CH	20 0	50 0	30 0	13 5	ND	ND	6 0	7 7	7 80
3	FSH	0	9 6	90 4	HC	CH	28 0	67 0	39 0	7 2	ND	ND	5 5	7 6	7 41
4	ND	11 3	40 6	48 2	C	CL	20 0	37 0	17 0	19 9	ND	ND	5 8	7 7	7 34
5	ND	8 7	42 6	48 8	SIC	CL	20.0	39.0	19.0	4 9	ND	ND	5 4	7 4	4 36

UNIT FSH
U.NO 1
UTN 5
T.NO 37
TWP 21
R 4
DIR W
MER 5
TLEN 720
INT 120
NOBS 6

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
22	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	25	ND	ND	32	57
23	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	15	ND	ND	34	49
24	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	23	ND	ND	47	70
25	FSH	NCON	REC	O	BL	CHER	TILL	FC	ND	ND	ND	ND	6	14	ND	ND	34	48
26	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	3	17	ND	ND	37	54
27	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	3	15	ND	ND	37	52

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
22	10YR	3	1	10YR	3	2	2.5Y	4	2	ST	F	SAB	BT	2	4	UP	L	HC
23	10YR	2	1	10YR	3	2	2.5Y	3	2	W	F	SAB	BT	2	6	CR	L	CL
24	10YR	2	1	10YR	4	1	2.5Y	3	2	ST	F	SAB	BT	ND	6	MID	L	CL
25	10YR	2	1	10YR	3	2	2.5Y	3	2	ST	F	SAB	BT	1	2	MID	L	HC
26	10YR	3	1	10YR	4	2	2.5Y	3	2	MS	F	SAB	BT	1	5	CR	L	CL
27	10YR	2	1	10YR	3	2	2.5Y	4	2	M	F	SAB	BT	1	4	MID	L	C

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
22	FSH	.0	17.9	82.1	HC	CH	28.0	64.0	36.0	.4	ND	ND	5.6	7.3	6.57
23	FSH	.0	28.2	71.8	HC	CH	29.0	57.0	28.0	8.1	ND	ND	5.3	7.5	7.43
24	FSH	.0	9.9	90.1	HC	CH	29.0	66.0	37.0	19.5	ND	ND	6.1	7.6	6.21
25	FSH	.0	17.6	82.4	HC	CH	29.0	66.0	37.0	.5	ND	ND	5.2	6.7	5.07
26	FSH	.0	25.3	74.7	HC	CH	29.0	59.0	30.0	.2	ND	ND	4.7	7.0	4.72
27	FSH	.0	9.3	90.7	HC	CH	30.0	69.0	39.0	15.3	ND	ND	5.2	7.6	6.32

UNIT FSH
U.NO 1
UTN 13
T.NO 16
TWP 22
R 3
DIR W
MER 5
TLEN 1560
INT 120
NOBS 13

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
74	ND	LCON	REC	GL	BL	CHER	LG	FC	ND	ND	ND	ND	ND	21	ND	ND	14	35
75	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	33	ND	ND	37	70
76	ND	LCON	REC	E	BL	CHER	LG	FC	ND	ND	ND	ND	ND	28	5	ND	30	63
77	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	15	ND	ND	31	46
78	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	15	ND	ND	18	33
79	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	15	ND	ND	7	22
80	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	17	ND	ND	16	33
81	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	19	ND	ND	21	40
82	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	16	ND	ND	24	40
83	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	15	ND	ND	23	38
84	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	13	ND	ND	21	34
85	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	22	ND	ND	20	42
86	ND	LCON	NREC	R	BL	CHER	LG	FC	ND	ND	ND	ND	ND	20	ND	ND	ND	20

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF C	SLOP	SL P	ATEX	BTEX
74	10YR	2	1	10YR	5	3	2.5Y	5	2	W	C	PR	BG	ND	2	UP	SIC	C
75	10YR	3	1	10YR	3	2	10YR	6	2	WM	F	SAB	BT	ND	1	ND	SIC	C
76	10YR	2	1	10YR	4	2	2.5Y	5	2	WM	F	SAB	BT	ND	1	ND	CL	C
77	10YR	2	1	10YR	4	2	2.5Y	6	2	M	FM	SAB	BT	ND	1	ND	CL	HC
78	10YR	3	1	10YR	4	2	2.5Y	5	2	WM	F	SAB	BT	ND	2	ND	CL	C
79	10YR	2	1	10YR	4	2	10YR	6	2	WM	F	SAB	BT	ND	1	ND	CL	C
80	10YR	2	1	10YR	4	2	2.5Y	5	2	MS	F	SAB	BT	ND	1	ND	CL	C
81	10YR	3	1	10YR	4	2	2.5Y	5	2	M	F	SAB	BM	ND	2	TOE	CL	C
82	10YR	2	1	10YR	4	2	2.5Y	5	2	M	F	SAB	BM	ND	1	ND	CL	C
83	10YR	3	1	10YR	5	4	2.5Y	6	2	WM	F	SAB	BM	ND	2	CR	CL	CL
84	10YR	2	1	10YR	5	3	2.5Y	5	2	WM	F	SAB	BM	ND	2	UP	SICL	CL
85	10YR	2	1	10YR	4	2	2.5Y	5	2	M	F	SAB	BM	ND	3	UP	SICL	CL
86	10YR	3	1	ND	ND	ND	2.5Y	6	2	ND	ND	ND	ND	ND	3	TOE	SIC	ND

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
74	ND	.0	31.4	68.6	HC	CH	24.0	51.0	27.0	28.3	2.29	ND	7.0	7.9	7.15
75	FSH	.0	43.1	56.9	SIC	CL	22.0	41.0	19.0	28.3	1.68	ND	7.0	8.0	8.69
76	ND	.0	42.5	57.5	SIC	CL	24.0	43.0	19.0	20.1	1.26	ND	6.8	7.6	6.54
77	FSH	.0	39.3	60.7	HC	CL	25.0	43.0	18.0	16.1	.38	ND	6.6	7.7	5.12
78	FSH	.0	36.7	63.3	HC	CL	24.0	43.0	19.0	32.4	3.81	ND	7.1	7.7	5.11
79	FSH	.0	39.7	60.3	HC	CL	24.0	44.0	20.0	38.9	.38	ND	6.9	8.0	6.33
80	FSH	.0	33.1	66.9	HC	CL	25.0	46.0	21.0	21.6	1.19	ND	7.1	8.0	6.41
81	FSH	.0	40.5	59.5	SIC	CL	24.0	44.0	20.0	18.2	ND	ND	5.8	7.7	6.58
82	FSH	.0	40.3	59.7	SIC	CL	25.0	46.0	21.0	10.7	ND	ND	5.7	7.4	6.82
83	FSH	.0	51.1	48.9	SIC	CL	24.0	40.0	16.0	20.7	ND	ND	5.6	7.7	5.61
84	FSH	.0	37.2	62.8	HC	CL	25.0	45.0	20.0	21.5	ND	ND	6.2	7.9	5.60
85	FSH	.0	30.5	69.5	HC	CH	27.0	51.0	24.0	18.6	ND	ND	5.9	7.7	5.26
86	ND	.0	42.9	57.1	HC	CL	25.0	41.0	16.0	37.0	4.17	ND	7.2	7.9	7.03

UNIT FSH
U.NO 1
UTN 16
T.NO 50
TWP 21
R 3
DIR W
MER 5
TLEN 720
INT 120
NOBS 6

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
104	ND	LCON	NREC	O	BL	CHER	LG	FC	ND	TILL	FC	C	ND	20	ND	ND	35	55
105	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	3	14	ND	ND	46	63
106	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	23	ND	ND	40	63
107	POT	HCON	REC	O	HG	GLEY	LG	FC	ND	TILL	FC	C	3	24	ND	ND	43	70
108	ND	MCON	NREC	R	BL	CHER	TILL	FC	C	ND	ND	ND	ND	30	ND	ND	ND	30
109	ND	LCON	NREC	O	BL	CHER	TILL	FC	C	ND	ND	ND	ND	20	ND	ND	23	43

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
104	10YR	3	1	10YR	4	2	2.5Y	3	2	MS	F	SAB	BT	ND	5	LOW	CL	HC
105	10YR	3	1	10YR	4	1	2.5Y	4	2	M	F	GRAN	BM	ND	7	MID	C	C
106	10YR	2	1	10YR	4	2	2.5Y	3	2	MS	F	GRAN	BM	ND	10	MID	C	C
107	10YR	3	1	10YR	5	1	2.5Y	6	1	M	F	GRAN	BG	ND	ND	ND	C	HC
108	10YR	2	1	ND	ND	ND	2.5Y	5	2	ND	ND	ND	ND	ND	10	UP	CL	ND
109	10YR	2	1	10YR	3	2	2.5Y	4	4	MS	F	SAB	BM	2	12	UP	CL	C

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
104	ND	7.2	36.8	56.0	SIC	CL	21.0	43.0	22.0	12.3	ND	ND	5.0	7.7	8.46
105	FSH	2.9	30.8	66.4	HC	CH	26.0	54.0	28.0	.8	ND	ND	6.1	7.5	6.76
106	FSH	.0	27.6	72.4	HC	CH	26.0	57.0	31.0	11.9	ND	ND	4.9	7.4	7.98
107	POT	5.0	40.4	54.7	SIC	CL	19.0	42.0	23.0	13.1	.68	ND	6.6	7.6	17.27
108	ND	8.8	35.8	55.4	SIC	CL	24.0	45.0	21.0	12.8	ND	ND	6.3	7.7	7.12
109	ND	12.1	45.1	42.8	SIC	CL	20.0	37.0	17.0	13.8	ND	ND	5.1	7.6	7.22

UNIT FSH
U.NO 1
UTN 18
T.NO 60
TWP 22
R 4
DIR W
MER 5
TLEN 1320
INT 120
NOBS 11

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2 T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
116	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	30	ND	ND	25	55
117	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	28	ND	ND	22	50
118	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	35	ND	ND	20	55
119	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	26	ND	ND	32	58
120	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	18	ND	ND	25	43
121	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	16	ND	ND	42	58
122	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	28	ND	ND	27	55
123	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	37	ND	ND	19	56
125	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	43	ND	ND	12	55
126	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	26	ND	ND	26	52
127	ND	LCON	NREC	O	GL	LUV	LG	FC	ND	ND	ND	ND	5	ND	12	10	48	70

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
116	10YR	3	1	10YR	4	2	2.5Y	3	2	M	FM	GRAN	BM	ND	8	MID	C	C
117	10YR	3	1	10YR	4	3	2.5Y	4	4	M	FM	GRAN	BM	ND	5	MID	C	C
118	10YR	3	1	10YR	3	3	2.5Y	4	2	MS	FM	SAB	BM	ND	10	UP	CL	C
119	10YR	2	1	10YR	4	1	2.5Y	5	2	MS	F	SAB	BM	ND	10	MID	CL	HC
120	10YR	2	1	10YR	4	1	2.5Y	4	2	ST	FM	GRAN	BM	ND	3	CR	C	HC
121	10YR	3	1	10YR	3	2	2.5Y	4	2	ST	FM	GRAN	BM	ND	2	CR	C	HC
122	10YR	2	1	10YR	4	2	2.5Y	5	2	W	FM	GRAN	BM	ND	6	LOW	CL	SICL
123	10YR	2	1	2.5Y	4	2	2.5Y	4	2	W	FM	GRAN	BM	ND	7	LOW	CL	C
125	10YR	3	2	10YR	4	2	2.5Y	4	2	WM	FM	SAB	BM	ND	8	MID	CL	C
126	10YR	3	1	2.5Y	3	2	2.5Y	5	2	ST	FM	SAB	BM	ND	12	UP	CL	HC
127	10YR	3	2	10YR	4	1	2.5Y	4	2	ST	MC	SAB	BT	ND	5	MID	L	HC

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
116	FSH	.0	30.2	69.8	HC	CL	24.0	49.0	25.0	17.5	ND	ND	5.4	7.6	7.73
117	FSH	.0	39.8	60.2	HC	CL	21.0	44.0	23.0	27.3	ND	ND	5.7	7.6	8.84
118	FSH	.0	22.0	78.0	HC	CH	28.0	56.0	28.0	17.1	ND	ND	5.0	7.4	7.04
119	FSH	.0	26.7	73.3	HC	CH	24.0	56.0	32.0	16.7	ND	ND	5.5	7.7	9.02
120	FSH	.0	30.0	70.0	HC	CL	22.0	47.0	25.0	26.2	ND	ND	6.4	7.7	4.38
121	FSH	.0	25.8	74.2	HC	CH	25.0	55.0	30.0	23.0	ND	ND	6.2	7.7	7.85
122	FSH	.0	29.5	70.5	HC	CL	25.0	48.0	23.0	28.5	ND	ND	5.9	7.6	10.19
123	FSH	.0	20.8	79.2	HC	CH	28.0	60.0	32.0	19.2	ND	ND	6.0	7.7	10.36
125	FSH	.0	28.4	71.6	HC	CH	31.0	59.0	28.0	15.4	ND	ND	6.2	7.6	8.98
126	FSH	.0	29.1	70.9	HC	CH	27.0	54.0	27.0	21.9	ND	ND	6.4	7.7	5.20
127	ND	.0	26.3	73.7	HC	CH	25.0	58.0	33.0	12.0	ND	ND	5.7	7.7	10.22

UNIT FSH
U.NO 1
UTN 50
T.NO 28
TWP 24
R 4
DIR W
MER 5
TLEN 840
INT 120
NOBS 7

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
329	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	16	ND	ND	26	42
330	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	23	ND	ND	42	65
331	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	20	ND	ND	40	60
332	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	20	ND	ND	40	60
333	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	33	ND	ND	32	65
334	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	21	ND	ND	42	63
335	ND	LCON	NREC	R	BL	CHER	LG	FC	ND	ND	ND	ND	ND	28	ND	ND	ND	28

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
329	10YR	2	1	10YR	4	2	2.5Y	5	2	MS	FM	SAB	BM	2	3	LOW	C	HC
330	10YR	2	1	10YR	4	2	2.5Y	4	2	MS	FM	SAB	BM	5	4	MID	C	HC
331	10YR	2	1	10YR	4	2	2.5Y	4	2	ST	FM	SAB	BM	5	3	LOW	C	HC
332	10YR	2	1	10YR	4	2	2.5Y	4	2	ST	FM	SAB	BM	1	3	MID	C	HC
333	10YR	2	1	10YR	4	2	2.5Y	4	2	ST	FM	SAB	BM	2	3	DEP	C	HC
334	10YR	2	1	2.5Y	4	2	2.5Y	4	2	MS	FM	SAB	BM	1	4	LOW	C	HC
335	10YR	2	1	ND	ND	ND	2.5Y	4	2	ND	ND	ND	ND	1	4	TOE	C	ND

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
329	FSH	2.2	35.4	62.4	HC	CL	24.0	49.0	25.0	18.1	.38	ND	6.8	7.7	6.94
330	FSH	.0	32.3	67.7	HC	CH	26.0	51.0	25.0	17.9	ND	ND	6.3	7.6	7.88
331	FSH	1.3	34.3	64.4	HC	CH	27.0	54.0	27.0	12.7	ND	ND	6.1	7.5	9.24
332	FSH	4.4	32.5	63.1	HC	CH	23.0	49.0	26.0	15.1	ND	ND	5.9	7.6	5.77
333	FSH	1.8	37.7	60.5	HC	CL	23.0	48.0	25.0	12.0	ND	ND	5.9	7.5	7.81
334	FSH	2.5	33.7	63.8	HC	CL	23.0	48.0	25.0	12.9	ND	ND	5.9	7.5	6.72
335	ND	.0	52.9	47.1	SIC	CH	28.0	50.0	22.0	11.1	.51	ND	6.5	7.7	6.44

UNIT FSH
U.NO 2
UTN 14
T.NO 12
TWP 24
R 3
DIR W
MER 5
TLEN 1320
INT 120
NOBS 11

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
87	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	20	ND	ND	13	33
88	ND	LCON	NREC	R	BL	CHER	LG	FC	ND	ND	ND	ND	ND	21	ND	ND	ND	21
89	POT	MCON	REC	R	HG	GLEY	LG	FC	ND	ND	ND	ND	ND	20	ND	ND	ND	0
90	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	5	16	ND	ND	26	47
91	ND	LCON	REC	GL	BL	CHER	LG	FC	ND	ND	ND	ND	ND	22	ND	ND	16	38
92	POT	MCON	REC	O	HG	GLEY	LG	FC	ND	ND	ND	ND	ND	17	ND	ND	10	27
93	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	15	ND	ND	10	25
94	ND	LCON	NREC	CA	BL	CHER	LG	FC	ND	ND	ND	ND	ND	20	ND	ND	20	20
95	ND	LCON	NREC	SZ	BL	CHER	LG	FC	ND	ND	ND	ND	ND	8	ND	13	22	33
96	ND	LCON	NREC	CA	BL	CHER	LG	FC	ND	ND	ND	ND	ND	20	ND	ND	12	20
97	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	25	ND	ND	30	55

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
87	10YR	2	1	10YR	4	2	2.5Y	4	2	MS	F	SAB	BT	ND	5	UP	CL	HC
88	10YR	2	1	ND	ND	ND	2.5Y	4	2	ND	ND	ND	ND	ND	1	LOW	C	ND
89	10YR	2	1	ND	ND	ND	2.5Y	5	2	ND	ND	ND	ND	ND	ND	DEP	HC	ND
90	10YR	3	2	10YR	4	2	2.5Y	6	2	MS	F	SAE	BM	ND	4	CR	CL	C
91	10YR	2	1	10YR	3	2	2.5Y	4	2	WM	FM	GRAN	BM	ND	3	LOW	CL	C
92	10YR	2	1	10YR	3	1	2.5Y	5	2	WM	FM	GRAN	BTG	ND	ND	DEP	L	HC
93	10YR	2	1	2.5Y	4	2	2.5Y	4	2	WM	FM	GRAN	BM	ND	2	LOW	CL	C
94	10YR	2	1	2.5Y	4	2	2.5Y	5	2	M	FM	GRAN	BMK	ND	2	CR	L	C
95	10YR	3	2	10YR	4	2	2.5Y	4	2	MS	MC	COL	BM	ND	2	LOW	CL	HC
96	10YR	3	1	10YR	4	2	2.5Y	4	2	WM	FM	GRAN	BMK	ND	2	UP	CL	C
97	10YR	2	1	10YR	3	2	2.5Y	5	2	M	F	SAB	BM	ND	5	MID	CL	C

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
87	FSH	.0	23.5	76.5	HC	CH	22.0	52.0	30.0	22.2	ND	ND	6.3	7.9	8.06
88	ND	.0	21.7	78.3	HC	CH	24.0	53.0	29.0	27.5	1.62	ND	7.2	7.9	9.53
89	POT	.0	35.3	64.7	HC	CL	21.0	47.0	26.0	22.3	1.94	ND	7.5	7.9	4.11
90	FSH	.0	30.6	69.4	HC	CH	28.0	54.0	26.0	25.0	.93	ND	6.6	7.7	8.30
91	ND	.0	39.7	60.3	HC	CL	21.0	39.0	18.0	36.9	ND	ND	6.1	7.8	13.52
92	POT	.0	43.8	56.2	ND	ND	17.0	35.0	18.0	44.6	76	ND	6.6	7.8	10.75
93	FSH	.0	38.1	61.9	HC	CL	19.0	41.0	22.0	37.7	.85	ND	6.9	8.3	14.05
94	ND	.0	34.2	65.8	HC	CL	21.0	43.0	22.0	39.4	.59	ND	6.8	8.0	8.74
95	ND	.0	23.6	76.4	HC	CH	24.0	54.0	30.0	25.1	ND	ND	6.0	8.1	8.95
96	ND	.0	31.9	68.1	HC	CL	23.0	42.0	19.0	35.6	2.45	ND	7.0	7.8	8.72
97	FSH	.0	27.2	72.8	HC	CL	26.0	49.0	23.0	22.7	ND	ND	5.6	7.8	9.09

UNIT FSH
U.NO 2
UTN 21
T NO 26
TWP 21
R 3
DIR W
MER 5
TLEN 600
INT 120
NOBS 5

URN	SER	CON	STAT	SG	GG	ORD	P1 M	P1 T	P1.S	P2.M	P2.T	P2.S	LFHT	AH T	AHET	AE T	B TH	LIME
142	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	23	ND	ND	12	35
143	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	21	ND	ND	45	66
144	ND	HCON	NREC	R	G	GLEY	LAC	FC	ND	EOL	FM	ND	23	5	ND	ND	NC	0
145	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	27	ND	ND	43	70
146	ND	MCON	REC	GL	BL	CHER	LG	FC	ND	TILL	FC	C	ND	30	ND	ND	40	70

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
142	10YR	2	1	10YR	4	2	2.5Y	4	2	MS	FM	SAB	BM	ND	4	CR	CL	HC
143	10YR	2	1	10YR	4	2	2.5Y	4	4	ST	FM	SAB	BM	ND	3	CR	CL	HC
144	2.5Y	3	1	ND	ND	ND	5Y	4	1	ND	ND	ND	ND	ND	ND	DEP	C	ND
145	10YR	2	1	10YR	4	2	2.5Y	5	2	ST	F	SAB	BM	ND	7	MID	SIL	HC
146	10YR	2	1	10YR	4	2	2.5Y	5	2	MS	F	SAB	BTG	1	2	CR	SIL	HC

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	AC03	EC	PHA	PHC	CARB
142	FSH	.0	37.0	63.0	HC	CH	30.0	56.0	26.0	8.8	ND	ND	5.9	7.5	8.83
143	FSH	9.8	39.5	50.7	C.	CL	21.0	40.0	19.0	15.2	ND	ND	5.1	7.6	8.43
144	ND	1.8	61.5	36.7	SICL	CL	31.0	44.0	13.0	4.9	3.63	ND	7.2	7.6	28.84
145	FSH	.0	29.5	70.5	HC	CH	26.0	55.0	29.0	23.7	ND	ND	5.0	7.7	8.40
146	ND	16.7	46.4	36.9	SICL	CL	18.0	33.0	15.0	.5	ND	ND	5.8	6.7	8.64

UNIT FSH
U.NO 2
UTN 31
T.NO 6
TWP 25
R 4
DIR W
MER 5
TLEN 1080
INT 120
NOBS 9

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
197	ND	LCON	NREC	CA	BL	CHER	LG	FC	ND	ND	ND	ND	ND	15	ND	ND	31	0
198	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	2C	ND	ND	6	26
199	ND	LCON	NREC	R	BL	CHER	LG	FC	ND	ND	ND	ND	ND	15	ND	ND	20	15
200	POT	HCON	REC	O	HG	GLEY	LG	FC	ND	TILL	FC	ND	ND	17	ND	ND	13	30
201	POT	HCON	REC	O	HG	GLEY	LG	FC	ND	ND	ND	ND	ND	16	ND	ND	22	38
202	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	42	ND	ND	15	57
203	ND	LCON	NREC	R	BL	CHER	LG	FC	ND	ND	ND	ND	ND	17	ND	ND	16	17
204	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	24	ND	ND	14	38
205	POT	HCON	REC	O	HG	GLEY	ND	FC	ND	ND	ND	ND	ND	13	8	ND	59	80

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF C	SLOP	SL P	ATEX	BTEX
197	10YR	2	1	2.5Y	4	2	2.5Y	5	2	M	F	SAB	BMK	ND	6	MID	CL	HC
198	10YR	2	1	10YR	5	2	2.5Y	5	2	M	M	PR	BM	ND	3	CR	CL	C
199	10YR	2	1	10YR	5	2	2.5Y	5	2	MS	F	SAB	BMK	ND	5	UP	CL	C
200	10YR	2	1	2.5Y	3	2	2.5Y	5	2	M	F	GRAN	BG	10	2	LOW	CL	CL
201	10YR	2	1	10YR	3	1	2.5Y	5	3	M	FM	GRAN	BG	ND	1	DEP	C	HC
202	10YR	2	1	10YR	3	2	2.5Y	5	2	WM	FM	GRAN	BM	ND	8	UP	SIL	C
203	10YR	2	1	10YR	4	1	10YR	5	2	W	FM	GRAN	BMK	ND	4	LOW	SIL	C
204	10YR	2	1	10YR	4	2	2.5Y	5	2	W	FM	GRAN	BM	2	3	TOE	SIL	C
205	10YR	2	1	10YR	4	1	2.5Y	5	1	M	MC	GRAN	BTG	ND	2	DEP	SIL	HC

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	AC03	EC	PHA	PHC	CARB
197	ND	.0	35.8	64 2	HC	CL	27.0	45.0	18.0	33.4	.30	ND	6.8	7.9	8.77
198	FSH	.0	52.0	48 0	ND	ND	29.0	44.0	15.0	39.8	.30	ND	6.6	7.8	7.84
199	ND	.0	42.5	57 5	SIC	CL	23.0	43.0	20.0	32.5	ND	ND	6.2	7 9	9.37
200	POT	12.3	41.5	45 1	SIC	CL	18.0	34 0	16.0	23.8	.25	ND	6.5	8 0	6.52
201	POT	.0	44.9	55 1	SIC	CL	19.0	35.0	16.0	27 5	76	ND	6.9	7.8	7.57
202	FSH	.0	43.0	57.0	SIC	CL	24.0	42 0	18 0	27 5	ND	ND	6.0	7 8	7.46
203	ND	.0	44.2	55.8	SIC	CL	26.0	42.0	16 0	34.4	ND	ND	6.2	7.8	7 63
204	FSH	.0	44.8	55.2	SIC	CL	23.0	40 0	17.0	36.1	29	ND	6.7	8.0	8.74
205	POT	.0	40 5	59.5	SIC	CL	23.0	45.0	22.0	24.7	ND	ND	6.0	7 8	6.86

UNIT FSH
U.NO 2
UTN 35
T.NO 1
TWP 25
R 4
DIR W
MER 5
TLEN 600
INT 120
NOBS 5

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
221	POT	HCON	REC	R	HG	GLEY	LG	FC	ND	ND	ND	ND	ND	18	ND	7	ND	18
222	POT	HCON	REC	R	HG	GLEY	LG	FC	ND	ND	ND	ND	12	15	ND	8	ND	15
223	ND	LCON	NREC	CA	BL	CHER	LG	FC	ND	ND	ND	ND	ND	20	ND	8	30	0
224	ND	LCON	NREC	CA	BL	CHER	LG	FC	ND	ND	ND	ND	ND	18	ND	ND	22	0
225	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	30	ND	ND	10	40

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
221	10YR	2	1	ND	ND	ND	2.5Y	4	2	ND	ND	ND	ND	ND	1	DEP	C	ND
222	10YR	2	1	ND	ND	ND	10YR	5	1	ND	ND	ND	ND	ND	ND	DEP	C	ND
223	10YR	2	1	10YR	5	3	2.5Y	5	2	WM	FM	SAB	BMK	ND	4	UP	CL	C
224	10YR	2	1	10YR	4	2	2.5Y	5	2	W	MC	PR	BMK	ND	7	MID	CL	C
225	10YR	2	1	10YR	4	3	10YR	5	2	WM	MC	PR	BM	ND	3	UP	L	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
221	POT	.0	40.8	59.2	SIC	CL	19.0	42.0	23.0	32.3	.50	ND	6.7	8.1	5.61
222	POT	.0	48.5	51.5	SIC	CL	18.0	33.0	15.0	43.9	5.19	ND	7.6	7.9	6.05
223	ND	.0	36.8	63.2	HC	CL	21.0	38.0	17.0	33.4	5.47	ND	7.0	7.8	9.71
224	ND	.0	44.0	56.0	SIC	CL	28.0	44.0	16.0	38.7	16.20	ND	7.2	7.8	8.28
225	FSH	.0	41.1	58.9	SIC	CL	23.0	43.0	20.0	28.7	1.61	ND	7.2	7.8	8.46

UNIT FSH
U.NO 2
UTN 51
T.NO 3
TWP 24
R 3
DIR W
MER 5
TLEN 600
INT 120
NOBS 5

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
336	ND	MCON	REC	R	BL	CHER	LG	FC	ND	ND	ND	ND	ND	18	ND	ND	ND	18
337	ND	MCON	REC	R	BL	CHER	LG	FC	ND	ND	ND	ND	ND	18	ND	ND	ND	0
338	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	30	ND	ND	18	48
339	POT	HCON	REC	O	HG	GLEY	LG	FC	ND	ND	ND	ND	ND	33	ND	ND	40	130
340	ND	LCON	REC	R	BL	CHER	LG	FC	ND	ND	ND	ND	ND	20	ND	ND	ND	20

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
336	10YR	2	1	ND	ND	ND	2.5Y	5	2	ND	ND	ND	ND	ND	5	CR	C	ND
337	10YR	2	1	ND	ND	ND	2.5Y	4	2	ND	ND	ND	ND	ND	2	TOE	C	ND
338	10YR	2	1	10YR	3	2	10YR	5	3	W	F	SAB	BM	ND	4	UP	CL	C
339	10YR	2	1	2 5Y	3	1	10YR	5	1	M	M	GRAN	BM	ND	ND	DEP	C	HC
340	10YR	2	1	ND	ND	ND	10YR	5	1	ND	ND	ND	ND	ND	3	UP	C	ND

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
336	ND	1.9	42.4	55.7	SIC	CL	23.0	45.0	22.0	22.2	3.79	ND	7.4	8.1	7.43
337	ND	1.8	52.8	45.3	SIC	CL	21.0	38.0	17.0	31.7	5.48	ND	7.1	7.9	7.66
338	FSH	.0	48.0	52.0	SIC	CL	25.0	44.0	19.0	30.8	.13	ND	6.9	7.9	7.77
339	POT	.2	36.9	62.9	HC	CH	28.0	57.0	29.0	1.3	ND	ND	5.7	7.4	9.25
340	ND	.0	46.5	53.5	SIC	CL	30.0	49.0	19.0	23.9	.85	ND	6.6	7.7	10.25

UNIT FSH
U.NO 3
UTN 22
T.NO 10
TWP 21
R 3
DIR W
MER 5
TLEN 960
INT 120
NOBS 8

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2 T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
148	FSH	NCON	REC	0	BL	CHER	LG	FC	ND	ND	ND	ND	ND	24	ND	ND	31	55
149	ND	LCON	REC	0	BL	CHER	LG	FC	ND	TILL	FC	C	ND	23	ND	ND	37	60
150	FSH	NCON	REC	0	BL	CHER	LG	FC	ND	ND	ND	ND	ND	24	ND	ND	51	75
151	ND	LCON	REC	0	BL	CHER	LG	FC	ND	TILL	FC	C	ND	13	ND	ND	37	50
152	ND	LCON	REC	0	BL	CHER	LG	FC	ND	TILL	FC	C	ND	23	ND	5	35	63
153	DVG	MCON	REC	0	BL	CHER	TILL	FC	C	ND	ND	ND	ND	17	ND	ND	43	60
154	ND	LCON	REC	0	BL	CHER	LG	FC	ND	TILL	FC	C	ND	20	ND	5	30	55
155	ND	LCON	REC	E	BL	CHER	LG	FC	ND	TILL	FC	C	ND	20	7	6	30	65

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL P	ATEX	BTEX
148	10YR	2	1	10YR	5	2	2.5Y	5	2	ST	F	SAB	BT	ND	3	UP	C	HC
149	10YR	2	1	10YR	4	1	2.5Y	5	2	ST	FM	SAB	BT	3	6	MID	CL	HC
150	10YR	2	1	10YR	4	1	2.5Y	5	2	M	FM	SAB	BT	ND	4	DEP	CL	HC
151	10YR	2	1	10YR	4	1	2.5Y	5	2	ST	FM	GRAN	BM	2	4	LOW	CL	HC
152	10YR	2	1	10YR	4	1	10YR	4	2	ST	FM	SAB	BT	1	4	CR	CL	HC
153	10YR	3	2	10YR	5	2	10YR	4	2	MS	FM	SAB	BT	30	5	CR	L	CL
154	10YR	2	1	10YR	4	2	2.5Y	5	2	ST	F	SAB	BT	2	4	MID	L	HC
155	10YR	3	1	10YR	4	2	10YR	4	2	ST	FM	SAB	BT	ND	ND	MID	L	HC

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
148	FSH	.0	15.2	84.8	HC	CL	21.0	46.0	25.0	7.9	ND	ND	5.5	7.6	7.47
149	ND	5.5	38.7	55.7	C.	CL	28.0	47.0	19.0	ND	ND	ND	ND	ND	ND
150	FSH	.0	31.3	68.7	HC	CH	23.0	53.0	30.0	12.0	.68	ND	6.5	7.7	16.48
151	ND	.2	37.8	62.0	HC	CL	21.0	46.0	25.0.	23.3	ND	ND	6.3	7.8	14.23
152	ND	2.9	34.0	63.1	HC	CL	22.0	46.0	24.0	13.6	ND	ND	5.2	7.6	7.84
153	DVG	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.7	ND	7.92
154	ND	.0	33.0	67.0	HC	CH	24.0	51.0	27.0	7.4	ND	ND	4.9	7.5	7.72
155	ND	3.4	42.6	54.0	SIC	CL	21.0	40.0	19.0	11.6	ND	ND	4.8	7.6	9.16

UNIT FSH
U.NO 3
UTN 29
T.NO 41
TWP 25
R 2
DIR W
MER 5
TLEN 500
INT 120
NOBS 4

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
192	ND	LCON	REC	0	BL	CHER	LG	FC	ND	TILL	FC	M	ND	14	ND	ND	32	46
194	FSH	NCON	REC	0	BL	CHER	LG	FC	ND	ND	ND	ND	ND	13	ND	ND	17	30
195	ND	LCON	REC	0	BL	CHER	LG	FC	ND	ND	ND	ND	ND	15	ND	ND	35	50
196	SPY	HCON	NREC	0	BL	CHER	TILL	FC	ND	ND	ND	ND	ND	14	ND	ND	21	35

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF C	SLOP	SL P	ATEX	BTEX
193	10YR	2	1	10YR	5	3	2.5Y	6	2	M	F	SAB	BM	ND	2	TOE	CL	C
194	10YR	3	1	10YR	3	2	2.5Y	5	2	MS	FM	SAB	BM	ND	2	UP	C	C
195	10YR	3	1	10YR	4	2	2.5Y	4	2	MS	FM	SAB	BM	ND	6	CR	C	C
196	10YR	3	1	10YR	3	3	10YR	6	3	W	F	SAB	BM	20	6	MID	C	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
193	ND	1.3	37.7	61.0	HC	CL	23.0	45.0	22.0	12.6	1.09	ND	6.8	7.8	4 53
194	FSH	.0	37.2	62.8	HC	CL	26.0	44.0	18.0	20.9	.67	ND	6.7	7.8	7.36
195	ND	.0	38.2	61.8	HC	CL	26.0	44.0	18.0	17.3	.55	ND	6.7	7.6	7.45
196	SPY	14.4	41.7	43.8	SIC	CL	26.0	43.0	17.0	24.0	.21	ND	6.5	7.5	5.46

UNIT FSH
U.NO 3
UTN 30
T.NO 46
TWP 24
R 3
DIR W
MER 5
TLEN 500
INT 120
NOBS 4

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
793	ND	LCON	NREC	R	BL	CHER	LG	FC	ND	TILL	FM	ND	ND	18	ND	ND	ND	18
794	FSH	NCON	REC	O	BL	CHER	LG	FM	ND	TILL	FM	ND	ND	24	ND	ND	26	50
795	FSH	NCON	REC	O	BL	CHER	LG	FM	ND	ND	ND	ND	ND	40	ND	ND	23	63
796	FSH	NCON	REC	O	BL	CHER	LG	FM	ND	TILL	FM	ND	ND	30	ND	ND	10	40

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
793	10YR	2	1	ND	ND	ND	2.5Y	4	2	ND	ND	ND	ND	ND	2	UP	L	ND
794	10YR	2	1	10YR	5	3	2.5Y	5	2	M	F	SAB	BM	ND	5	MID	L	SICL
795	10YR	2	1	10YR	3	2	2.5Y	5	2	M	F	SAB	BM	ND	6	MID	CL	SICL
796	10YR	2	1	10YR	4	2	2.5Y	5	2	M	MC	PR	BM	ND	4	TOE	CL	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
793	ND	1.3	37.7	61.0	HC	CL	27.0	45.0	18.0	21.9	ND	ND	6.8	7.7	6.54
794	FSH	0	47.8	52.2	SIC	CL	27.0	44.0	17.0	25.3	ND	ND	6.4	7.8	6.53
795	FSH	0	52.2	47.8	SIC	CL	24.0	41.0	17.0	6.7	ND	ND	5.9	7.3	6.93
796	FSH	0	51.7	48.3	SIC	CL	23.0	38.0	15.0	23.4	ND	ND	6.5	7.8	5.48

UNIT FSH
U.NO 3
UTN 32
T.NO 28
TWP 24
R 4
DIR W
MER 5
TLEN 600
INT 120
NOBS 5

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
206	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	22	ND	2	40	64
207	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	26	ND	ND	28	54
208	FSH	NCON	REC	O	BL	CHER	LG	FC	ND	ND	ND	ND	ND	15	4	ND	35	54
209	FSH	NCON	REC	O	BL	CHER	LC	FC	ND	ND	ND	ND	ND	28	ND	ND	34	62
210	ND	MCON	NREC	BL	SO	SOLZ	LG	FC	ND	ND	ND	ND	ND	6	ND	8	20	34

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
206	10YR	2	1	10YR	4	1	2.5Y	5	2	ST	F	SAB	BM	ND	3	UP	CL	HC
207	10YR	2	1	10YR	4	1	2.5Y	4	2	ST	F	SAB	BM	ND	3	UP	CL	HC
208	10YR	2	1	10YR	4	1	10YR	4	2	ST	F	SAB	BT	ND	3	MID	CL	HC
209	10YR	2	1	10YR	4	1	10YR	4	2	ST	F	SAB	BM	ND	3	LOW	C	HC
210	10YR	2	1	10YR	4	1	2.5Y	5	2	ST	MC	COL	BNT	ND	3	TOE	L	HC

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
206	FSH	ND	ND	ND	ND	ND	ND	ND	ND	ND	14.63	ND	6.2	ND	10.69
207	FSH	.0	26.1	73.9	HC	CH	27.0	55.0	28.0	9.2	ND	ND	6.2	7.6	8.60
208	FSH	.0	24.1	75.9	HC	CH	30.0	52.0	22.0	9.4	ND	ND	6.1	7.6	7.13
209	FSH	.0	17.5	82.5	HC	CH	29.0	59.0	30.0	11.4	ND	ND	5.8	7.6	8.77
210	ND	.0	15.2	84.8	HC	CH	31.0	67.0	36.0	12.2	ND	ND	6.0	8.4	6.92

UNIT LLK
U.NO 1
UTN 46
T.NO 68
TWP 24
R 2
DIR W
MER 5
TLEN 480
INT 120
NOBS 4

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
292	ND	LCON	REC	CA	BL	CHER	LG	FM	ND	ND	ND	ND	ND	13	ND	ND	11	0
293	LLK	NCON	REC	O	BL	CHER	LG	FM	ND	ND	ND	ND	ND	17	ND	ND	22	39
294	LLK	NCON	REC	O	BL	CHER	LG	FM	ND	ND	ND	ND	ND	19	ND	ND	29	48
295	BPW	LCON	REC	R	BL	CHER	LG	FM	ND	ND	ND	ND	ND	18	ND	ND	11	18

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
292	10YR	2	1	10YR	4	3	10YR	5	3	M	M	PR	BMK	ND	2	UP	SICL	SICL
293	10YR	2	1	10YR	4	3	10YR	5	3	W	M	PR	BM	1	3	MID	L	SICL
294	10YR	2	1	10YR	4	3	10YR	5	3	M	M	PR	BM	ND	4	LOW	L	SIC
295	10YR	2	1	10YR	5	3	10YR	5	3	W	M	PR	BMK	ND	4	TOE	L	SICL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
292	ND	.0	53.6	46.4	SIC	CL	23.0	39.0	16.0	33.9	13.14	ND	7.2	7.9	5.88
293	LLK	.0	50.4	49.6	SIC	CL	26.0	42.0	16.0	39.2	.76	ND	7.2	7.7	5.94
294	LLK	.0	55.2	44.8	SIC	CL	24.0	38.0	14.0	32.8	.66	ND	7.0	7.7	5.99
295	BPW	5.2	55.6	39.2	SICL	CL	24.0	36.0	12.0	29.2	.72	ND	6.9	8.0	4.77

UNIT LLK
U.NO 1
UTN 47
T NO 5
TWP 25
R 3
DIR W
MER 5
TLEN 1320
INT 120
NOBS 11

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
296	BPW	LCON	REC	R	BL	CHER	LG	FM	ND	ND	ND	ND	ND	12	ND	ND	ND	0
297	ND	LCON	NREC	O	BL	CHER	LG	FM	ND	ND	ND	ND	ND	45	ND	ND	35	80
298	BPW	LCON	REC	R	BL	CHER	LG	FM	ND	ND	ND	ND	ND	20	ND	ND	ND	0
299	ND	LCON	REC	CA	BL	CHER	LG	FM	ND	ND	ND	ND	ND	23	ND	ND	22	0
300	ND	MCON	REC	O	HR	REGO	LG	FM	ND	ND	ND	ND	ND	10	ND	ND	ND	0
301	LLK	NCON	REC	O	BL	CHER	LG	FM	ND	ND	ND	ND	ND	18	ND	ND	17	35
302	BPW	LCON	REC	R	BL	CHER	LG	FM	ND	ND	ND	ND	ND	19	ND	ND	ND	0
303	LLK	NCON	REC	O	BL	CHER	LG	FM	ND	ND	ND	ND	ND	15	ND	ND	20	35
304	BPW	LCON	REC	R	BL	CHER	LG	FM	ND	ND	ND	ND	ND	12	ND	ND	ND	0
305	BPW	LCON	REC	R	BL	CHER	LG	FM	ND	ND	ND	ND	ND	14	ND	ND	5	19
306	ND	MCON	REC	O	HR	REGO	LG	FM	ND	ND	ND	ND	ND	9	ND	ND	ND	0

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF C	SLOP	SL P	ATEX	BTEX
296	10YR	3	2	ND	ND	ND	10YR	5	3	ND	ND	ND	ND	ND	11	CR	SICL	ND
297	10YR	2	1	10YR	4	3	10YR	5	3	W	M	PR	BM	ND	3	TOE	L	C
298	10YR	3	1	ND	ND	ND	10YR	6	3	ND	ND	ND	ND	ND	14	UP	SIL	ND
299	10YR	3	1	10YR	5	2	10YR	5	3	W	M	PR	BMK	ND	8	LOW	SIL	SICL
300	10YR	4	2	ND	ND	ND	10YR	5	3	ND	ND	ND	ND	ND	9	UP	SICL	ND
301	10YR	3	1	10YR	4	3	10YR	5	3	WM	MC	PR	BM	ND	8	TOE	SIL	SICL
302	10YR	3	1	ND	ND	ND	10YR	6	3	ND	ND	ND	ND	ND	10	MID	SIL	ND
303	10YR	3	1	10YR	4	3	10YR	6	3	WM	M	PR	BM	ND	2	CR	SIL	SIL
304	10YR	4	2	ND	ND	ND	10YR	5	3	ND	ND	ND	ND	ND	12	MID	SICL	ND
305	10YR	3	1	10YR	4	3	10YR	5	3	W	M	PR	BM	ND	7	MID	SIL	SICL
306	10YR	4	2	ND	ND	ND	10YR	6	3	ND	ND	ND	ND	1	11	UP	SICL	ND

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
296	BPW	11.3	58.6	30.1	SIL	CL	21.0	30.0	9.0	30.3	12.96	ND	7.3	7.8	6.17
297	ND	.0	52.2	47.8	SIC	CL	23.0	39.0	16.0	19.3	.30	ND	6.7	7.6	8.48
298	BPW	.0	56.8	43.2	SIC	ML	26.0	39.0	13.0	33.6	4.23	ND	7.2	7.9	6.53
299	ND	4.8	46.4	48.8	SIC	CL	23.0	41.0	18.0	25.7	2.20	ND	7.2	7.8	6.54
300	ND	4.4	58.4	37.2	SICL	CL	21.0	34.0	13.0	19.3	13.10	ND	7.3	8.0	5.34
301	LLK	14.2	47.4	38.4	SICL	CL	22.0	36.0	14.0	16.0	3.37	ND	7.3	7.7	4.69
302	BPW	3.3	53.4	43.3	SIC	ML	29.0	43.0	14.0	35.8	8.00	ND	7.3	7.8	5.60
303	LLK	.0	45.1	54.9	SIC	CL	24.0	42.0	18.0	26.1	.68	ND	7.2	7.8	5.65
304	BPW	7.3	48.5	44.2	SIC	CL	23.0	37.0	14.0	25.1	3.99	ND	7.3	7.7	4.65
305	BPW	.0	42.5	57.5	SIC	CL	26.0	44.0	18.0	28.4	1.19	ND	7.1	7.9	6.27
306	ND	5.8	51.8	42.3	SIC	CL	23.0	38.0	15.0	26.2	12.10	ND	7.3	8.0	5.71

UNIT LLK
U.NO 1
UTN 48
T.NO 27
TWP 25
R 3
DIR W
MER 5
TLEN 720
INT 120
NOBS 6

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1 T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
310	ND	LCON	NREC	GL	BL	CHER	LG	FM	ND	ND	ND	ND	ND	45	ND	ND	55	100
311	LLK	NCON	REC	O	BL	CHER	LG	FM	ND	ND	ND	ND	ND	40	ND	ND	50	90
312	LLK	NCON	REC	O	BL	CHER	LG	FM	ND	ND	ND	ND	ND	18	ND	ND	28	46
313	ND	LCON	REC	CA	BL	CHER	LG	FM	ND	ND	ND	ND	ND	16	ND	ND	15	0
314	BPW	LCON	REC	R	BL	CHER	LG	FM	ND	ND	ND	ND	ND	10	ND	ND	ND	0
315	BPW	LCON	REC	R	BL	CHER	LG	FM	ND	ND	ND	ND	ND	10	.ND	ND	ND	10

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
310	10YR	2	1	10YR	5	4	10YR	5	3	W	M	PR	BM	ND	4	TOE	SIL	SICL
311	10YR	2	1	10YR	3	3	2.5Y	5	2	M	MC	PR	BM	1	3	MID	L	SICL
312	10YR	2	1	10YR	3	3	10YR	5	2	M	MC	PR	BM	3	6	UP	L	SICL
313	10YR	3	2	10YR	4	2	10YR	5	3	M	MC	PR	BMK	1	8	MID	L	SIL
314	10YR	2	1	ND	ND	ND	10YR	5	2	ND	ND	ND	ND	ND	9	UP	L	ND
315	10YR	2	1	ND	ND	ND	10YR	5	3	ND	ND	ND	ND	ND	4	CR	L	ND

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
310	ND	4.7	65.5	29.8	SICL	CL	21.0	29.0	8.0	15.9	.25	ND	6.7	7.4	6.95
311	LLK	2 7	57.5	39.8	SICL	CL	21.0	38.0	17.0	12.8	ND	ND	ND	7.6	ND
312	LLK	ND	ND	ND	ND	ML	24.0	37.0	13.0	ND	2.71	ND	7.0	8.1	6.44
313	ND	.0	48.4	51.6	SIC	ML	26.0	44.0	18.0	33.2	.30	ND	6.6	8.0	7.33
314	BPW	.0	54.0	46.0	SIC	ML	25.0	36.0	11.0	41.7	3.89	ND	7.0	8.1	5.46
315	BPW	19.1	45.2	35.7	SICL	CL	17.0	27.0	10.0	25.5	.25	ND	6.8	8.1	6.04

UNIT LLK
U.NO 1
UTN 49
T.NO 31
TWP 24
R 3
DIR W
MER 5
TLEN 1560
INT 120
NOBS 13

URN	SER	CON	STAT	SG	GG	ORD	P1 M	P1 T	P1.S	P2 M	P2 T	P2 S	LFHT	AH T	AHET	AE T	B TH	LIME
316	LLK	NCON	REC	O	BL	CHER	LG	FM	ND	ND	ND	ND	ND	17	ND	ND	21	38
317	BPW	LCON	REC	R	BL	CHER	LG	FM	ND	ND	ND	ND	ND	22	ND	ND	ND	22
318	LLK	NCON	REC	O	BL	CHER	LG	FM	ND	ND	ND	ND	ND	22	ND	ND	18	40
319	BPW	LCON	REC	R	BL	CHER	LG	FM	ND	ND	ND	ND	ND	26	ND	ND	10	26
320	ND	LCON	REC	CA	BL	CHER	LG	FM	ND	ND	ND	ND	ND	43	ND	ND	25	18
321	LLK	NCON	REC	O	BL	CHER	LG	FM	ND	ND	ND	ND	ND	16	ND	ND	17	33
322	ND	LCON	REC	CA	BL	CHER	LG	FM	ND	ND	ND	ND	ND	18	ND	ND	32	0
323	LLK	NCON	REC	O	BL	CHER	LG	FM	ND	ND	ND	ND	ND	17	ND	ND	13	30
324	LLK	NCON	REC	O	BL	CHER	LG	FM	ND	ND	ND	ND	ND	23	ND	ND	16	39
325	LLK	NCON	REC	O	BL	CHER	LG	FM	ND	ND	ND	ND	ND	29	ND	ND	21	50
326	ND	LCON	REC	R	BL	CHER	LG	FM	ND	ND	ND	ND	ND	20	ND	ND	5	23
327	BPW	LCON	REC	R	BL	CHER	LG	FM	ND	ND	ND	ND	ND	19	ND	ND	ND	0
328	LLK	NCON	REC	O	BL	CHER	LG	FM	ND	ND	ND	ND	ND	20	ND	ND	27	47

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
316	10YR	2	1	10YR	3	3	10YR	5	3	W	M	PR	BM	ND	2	LOW	SIL	SICL
317	10YR	2	1	ND	ND	ND	10YR	5	2	ND	ND	ND	ND	ND	3	UP	SIL	ND
318	10YR	2	1	10YR	4	2	2.5Y	5	2	W	M	PR	BM	ND	3	TOE	SIL	SIL
319	10YR	2	1	10YR	4	2	2.5Y	5	2	W	M	PR	BMK	ND	2	UP	SIL	SIL
320	10YR	2	1	10YR	4	3	2.5Y	5	2	W	M	PR	BMK	ND	2	MID	SIL	SIL
321	10YR	2	1	10YR	4	2	2.5Y	5	2	W	M	PR	BM	ND	3	UP	L	SICL
322	10YR	2	1	10YR	4	2	2.5Y	5	2	W	MC	PR	BMK	ND	3	UP	L	SICL
323	10YR	2	1	10YR	3	3	2.5Y	5	2	M	M	PR	BM	ND	3	UP	L	SIL
324	10YR	2	1	10YR	3	3	10YR	5	3	W	M	PR	BM	ND	3	UP	L	SICL
325	10YR	2	1	10YR	4	3	2.5Y	5	2	W	M	PR	BM	ND	2	UP	L	SICL
326	10YR	2	1	10YR	3	3	2.5Y	5	2	W	M	PR	BMK	3	3	UP	L	SICL
327	10YR	2	1	ND	ND	ND	2.5Y	5	2	ND	ND	ND	ND	ND	1	DEP	SICL	ND
328	10YR	2	1	10YR	3	3	2.5Y	5	2	W	M	PR	BM	ND	4	UP	SICL	SICL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
316	LLK	21.1	45.0	33.9	CL	CL	19.0	30.0	11 0	26.9	1.95	ND	7.1	7.8	5.11
317	BPW	16.1	52.2	31.7	SICL	CL	22.0	30.0	8.0	24.2	1.52	ND	7.2	7.8	4.29
318	LLK	20.2	48.3	31.5	CL	CL	22.0	30.0	8.0	27.0	1.44	ND	7 2	7 7	4.69
319	BPW	11.8	47.8	40.5	SIC	CL	21.0	31 0	10.0	19.3	ND	ND	7.2	7.8	5.80
320	ND	12.0	55.4	32.5	SICL	CH	22.0	50.0	28.0	28.9	2.03	ND	7.1	7.8	5.77
321	LLK	11.4	59.1	29.5	SICL	CL	18.0	25.0	7.0	21 9	.63	ND	7.1	7.7	5.98
322	ND	17.4	50.0	32.6	SICL	CL	22.0	33.0	11.0	18.9	2.62	ND	7.2	7 9	5.71
323	LLK	.0	49.8	50.2	SIC	ML	26.0	44.0	18.0	25.8	.68	ND	7.2	7.8	5.57
324	LLK	10.4	64.6	25.0	SIL	CL	20.0	28.0	8.0	23.2	.72	ND	7.1	7.7	4.31
325	LLK	.0	55 4	44.6	SICL	CL	25.0	41.0	16.0	28.0	.46	ND	6.9	7.7	6.62
326	ND	18.5	43.2	38.4	SICL	CL	23.0	41.0	18.0	37.3	2.53	ND	7.1	8.0	5.84
327	BPW	7.3	47.1	45.5	SIC	CL	24.0	41.0	17.0	15.5	3.71	ND	7.5	7.9	5.97
328	LLK	13.8	54.3	31.9	SICL	CL	19.0	29.0	10.0	17.5	.51	ND	7.1	7.8	6.10

UNIT LTC
U.NO 1
UTN 61
T.NO 31
TWP 21
R 2
DIR W
MER 5
TLEN 420
INT 60
NOBS 7

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
417	ND	LCON	REC	D	GL	LUV	TILL	FL	M	ND	ND	ND	6	5	4	5	64	78
418	LTC	NCON	REC	D	GL	LUV	TILL	FL	M	ND	ND	ND	7	3	ND	15	64	82
419	ND	LCON	REC	D	GL	LUV	TILL	FL	M	ND	ND	ND	8	4	5	6	63	80
420	LTC	NCON	REC	D	GL	LUV	TILL	FL	M	ND	ND	ND	7	ND	3	6	56	65
421	ND	LCON	REC	D	GL	LUV	TILL	FL	M	ND	ND	ND	8	ND	10	9	73	92
422	ND	LCON	REC	D	GL	LUV	TILL	FL	M	ND	ND	ND	9	2	8	6	74	90
423	ND	LCON	REC	D	GL	LUV	TILL	FL	M	ND	ND	ND	7	2	5	9	88	84

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
417	10YR	2	1	10YR	5	3	2.5Y	4	2	MS	FM	SAB	BT	10	25	UP	L	CL
418	10YR	5	3	10YR	4	3	2.5Y	4	2	ST	FM	SAB	BT	10	25	MID	SIL	CL
419	10YR	2	1	10YR	4	3	2.5Y	5	2	ST	FM	SAB	BT	10	20	LOW	SIL	CL
420	10YR	4	2	10YR	5	4	2.5Y	5	2	ST	FM	SAB	BT	10	18	MID	SIL	CL
421	10YR	4	1	10YR	4	3	2.5Y	5	2	MS	FM	SAB	BT	10	10	TOE	SIL	C
422	10YR	3	2	10YR	4	2	10YR	5	2	ST	FM	SAB	BT	10	3	TOE	L	C
423	10YR	3	1	10YR	4	3	10YR	5	2	MS	_FM	SAB	BT	10	14	LOW	SIL	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	AC03	EC	PHA	PHC	CARB
417	ND	12.5	42.4	45.2	SIC	CL	20.0	40.0	20.0	6.0	ND	.4	5.6	7.4	5.52
418	LTC	14.6	41.9	43.5	SIC	CL	19.0	35.0	16.0	4.5	ND	.4	5.2	7.3	1.66
419	ND	12.9	41.1	46.0	SIC	CL	19.0	35.0	16.0	4.7	ND	.4	4.9	7.5	7.82
420	LTC	10.2	47 2	42.6	SIC	CL	18.0	33.0	15.0	14.3	ND	.4	4.3	7.5	5.57
421	ND	22.6	41.2	36.2	SICL	CL	16.0	30.0	14.0	8.3	ND	.4	5.1	7.5	3.19
422	ND	11.7	42.4	46.0	SIC	CL	18.0	33.0	15.0	5.5	ND	.4	5.1	7.4	3.87
423	ND	22.1	40.0	37.9	SICL	CL	17 0	30.0	13.0	8.5	ND	.6	5.6	7.4	6.36

UNIT LTC
U.NO 1
UTN 62
T.NO 34
TWP 21
R 2
DIR W
MER 5
TLEN 420
INT 60
NOBS 7

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
424	DVG	MCON	NREC	O	BL	CHER	TILL	FL	M	ND	ND	ND	5	14	5	ND	55	74
425	DVG	MCON	NREC	O	BL	CHER	TILL	FL	M	ND	ND	ND	1	20	ND	ND	20	72
426	DVG	MCON	NREC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	30	ND	ND	25	65
427	PUP	HCON	NREC	O	BL	CHER	COL	FL	ND	TILL	FL	M	2	34	ND	ND	100	ND
428	ND	HCON	NREC	O	BL	CHER	COL	FL	ND	TILL	FL	ND	4	20	ND	ND	68	92
429	ND	HCON	NREC	O	BL	CHER	COL	FL	ND	TILL	FL	ND	3	35	ND	ND	45	80
430	DVG	MCON	NREC	O	BL	CHER	TILL	FL	ND	ND	ND	ND	2	30	ND	ND	54	84

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
424	10YR	2	1	10YR	4	4	10YR	5	2	MS	FM	SAB	BM	10	25	UP	L	CL
425	10YR	2	1	10YR	4	3	2.5Y	5	2	M	F	SAB	BM	10	18	UP	L	CL
426	10YR	2	1	10YR	4	3	2.5Y	5	2	M	M	PR	BM	4	9	UP	L	CL
427	10YR	3	1	10YR	4	4	ND	ND	ND	SL	ND	MASS	BC	ND	10	UP	L	L
428	10YR	3	1	10YR	4	4	10YR	4	3	SL	ND	MASS	BC	10	17	MID	L	L
429	10YR	2	1	10YR	4	4	10YR	6	2	SL	ND	MASS	BC	5	14	MID	L	L
430	10YR	2	1	10YR	4	4	10YR	5	2	W	M	PR	BM	10	15	TOE	L	L

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	AC03	EC	PHA	PHC	CARB
424	DVG	16.0	48.2	35 8	SICL	CL	18.0	31.0	13.0	5.6	ND	.4	5.8	7.5	7.32
425	DVG	16.1	47.5	36 4	SICL	CL	19.0	30.0	11.0	12.1	ND	.3	5.7	7.4	8.56
426	DVG	3.1	55.4	41.5	SIC	CL	23.0	39.0	16.0	24.0	1.81	4	7.1	7.5	ND
427	PUP	21.5	44.8	33.7	CL	CL	19.0	35.0	16.0	.2	.55	.6	6.9	7.7	4.40
428	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.6	ND	6.07
429	ND	13.2	44.2	42 7	SIC	CL	20.0	35.0	15 0	15.1	ND	.4	5.6	7.3	5.93
430	DVG	13.4	48.8	27 9	SICL	CL	18.0	31.0	13.0	10.2	ND	.4	4.9	7.5	7.47

UNIT LTC
U.NO 1
UTN 63
T.NO 46
TWP 22
R 3
DIR W
MER 5
TLEN 300
INT 60
NOBS 5

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B TH	LIME
431	LTC	NCON	REC	O	GL	LUV	TILL	FL	M	ND	ND	ND	5	ND	ND	13	57	70
432	ND	MCON	NREC	O	GL	LUV	TILL	FL	M	RES	MS	ND	6	ND	4	11	55	ND
433	LTC	NCON	REC	O	GL	LUV	TILL	FL	M	ND	ND	ND	8	ND	1	11	51	63
435	ND	MCON	NREC	O	GL	LUV	TILL	FL	M	RES	MS	ND	5	ND	ND	12	50	107
436	ND	HCON	NREC	O	EB	BRUN	COL	MS	ND	RES	MS	ND	15	ND	ND	3	60	120

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
431	10YR	4	2	10YR	4	3	10YR	6	3	MS	FM	SAB	BT	5	5	CR	SIL	CL
432	10YR	5	4	10YR	4	3	2.5Y	6	4	MS	F	SAB	BT	ND	15	UP	SIL	CL
433	10YR	5	3	10YR	4	3	2.5Y	5	4	MS	FM	SAB	BT	5	15	MID	SIL	CL
435	75YR	5	4	10YR	4	3	2.5Y	5	3	M	F	SAB	BT	ND	14	MID	L	CL
436	ND	ND	ND	10YR	4	4	2.5Y	4	2	SL	ND	MASS	BM	20	40	LOW	ND	SL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	AC03	EC	PHA	PHC	CARB
431	LTC	8.4	57.4	34.1	SICL	ML	32.0	44.0	12.0	19.7	ND	.5	5.1	7.6	2.36
432	ND	21.2	52.5	26.3	SIL	ML	22.0	30.0	8.0	.3	ND	.4	4.6	6.5	.93
433	LTC	16.8	45.2	38.0	SICL	CL	21.0	35.0	14.0	9.8	ND	.5	4.8	7.4	1.68
435	ND	45.2	33.5	21.4	L	SC	27.0	33.0	6.0	11.7	ND	.6	4.5	7.5	1.58
436	ND	34.2	42.4	23.4	L	ML	25.0	31.0	6.0	.6	ND	.5	5.3	7.2	.78

UNIT LTC
U.NO 1
UTN 64
T NO 60
TWP 22
R 3
DIR W
MER 5
TLEN 360
INT 60
NOBS 6

URN	SER	CON	STAT	SG	GC	ORD	P1 M	P1 T	P1 S	P2 M	P2 T	P2 S	LFHT	AH T	AHET	AE T	B TH	LIME
437	LTC	NCON	REC	O	GL	LUV	TILL	FL	M	ND	ND	ND	7	ND	3	14	48	65
438	DVG	HCON	NREC	O	BL	CHER	TILL	FL	M	ND	ND	ND	2	25	ND	ND	58	83
439	DVG	HCON	NREC	O	BL	CHER	TILL	FL	M	ND	ND	ND	3	30	10	ND	50	90
440	DVG	HCON	NREC	O	BL	CHER	TILL	FL	M	ND	ND	ND	4	37	ND	ND	43	80
441	LTC	NCON	REC	O	GL	LUV	TILL	FL	M	ND	ND	ND	8	ND	2	10	51	63
442	LTC	NCON	REC	O	GL	LUV	TILL	FL	M	ND	ND	ND	3	ND	3	15	82	100

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
437	10YR	5	3	10YR	4	3	2.5Y	5	2	M	F	SAB	BT	10	7	LOW	L	CL
438	10YR	2	1	10YR	4	3	2.5Y	5	2	W	F	SAB	BM	5	6	MID	L	CL
439	10YR	2	1	10YR	4	3	2.5Y	5	2	M	F	SAB	BM	5	4	MID	L	CL
440	10YR	2	1	10YR	4	2	2.5Y	5	2	M	F	SAB	BM	10	3	UP	L	CL
441	10YR	5	2	10YR	4	2	2.5Y	5	2	M	FM	SAB	BT	10	5	UP	L	CL
442	10YR	5	2	10YR	4	3	2.5Y	5	2	M	FM	SAB	BT	10	6	UP	L	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	AC03	EC	PHA	PHC	CARB
437	LTC	21.6	44.8	33.7	CL	CL	18.0	27.0	9.0	10.4	ND	.4	5.1	7.4	2.15
438	DVG	23.4	44.5	32.2	CL	CL	19.0	31.0	12.0	9.9	ND	4	5.0	7.5	5.56
439	DVG	17.3	47.0	35.6	SICL	CL	18.0	30.0	12.0	13.1	ND	.4	ND	7.6	ND
440	DVG	25.2	41.3	33.4	CL	CL	16.0	26.0	10.0	12.3	ND	.4	5.3	7.5	3.74
441	LTC	11.7	49.2	39.1	SICL	CL	22.0	37.0	15.0	12.5	ND	.4	4.5	7.5	2.98
442	LTC	26.7	44.3	28.9	CL	CL	17.0	26.0	9 0	5.2	ND	.5	4.6	7.3	1.23

UNIT LTC
U.NO 1
UTN 65
T.NO 67
TWP 24
R 2
DIR W
MER 5
TLEN 600
INT 60
NOBS 10

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
443	ND	LCON	REC	D	GL	LUV	TILL	FL	M	ND	ND	ND	5	ND	6	13	31	50
444	ND	MCON	NREC	O	DG	CHER	COL	MS	ND	TILL	FL	ND	5	7	5	ND	61	83
445	ND	MCON	NREC	O	DG	CHER	TILL	FL	M	ND	ND	ND	5	8	3	ND	16	27
446	ND	LCON	REC	D	GL	LUV	TILL	FL	M	ND	ND	ND	5	2	5	5	36	48
447	ND	LCON	REC	D	GL	LUV	TILL	FL	M	ND	ND	ND	3	3	6	6	28	43
448	ND	HCON	NREC	O	BL	CHER	RES	CS	ND	ND	ND	ND	4	25	ND	ND	40	65
449	ATL	MCON	NREC	O	BL	CHER	TILL	FL	M	ND	ND	ND	3	18	ND	ND	32	50
450	ND	LCON	REC	D	GL	LUV	TILL	FL	M	ND	ND	ND	3	3	5	5	18	30
451	PUP	MCON	REC	O	BL	CHER	COL	FL	ND	TILL	FL	M	2	40	ND	ND	70	110
452	DVG	MCON	NREC	O	BL	CHER	TILL	FL	M	ND	ND	ND	2	38	ND	ND	42	80

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
443	10YR	2	1	10YR	4	4	2.5Y	5	2	WM	F	SAB	BT	15	17	UP	SIL	CL
444	10YR	3	1	10YR	4	4	10YR	5	4	SL	ND	MASS	BM	15	33	UP	L	SL
445	10YR	2	1	10YR	4	4	10YR	5	4	SL	ND	MASS	BM	10	25	MID	L	L
446	10YR	3	2	10YR	4	4	10YR	5	2	W	F	SAB	BT	10	35	MID	L	CL
447	10YR	3	2	10YR	4	4	10YR	5	2	WM	F	SAB	BT	10	20	UP	L	CL
448	10YR	2	1	10YR	4	4	10YR	5	2	W	M	PR	BM	ND	25	UP	L	SL
449	10YR	3	1	10YR	4	4	10YR	5	2	W	F	SAB	BM	10	15	MID	L	CL
450	10YR	2	1	10YR	4	4	10YR	5	2	WM	F	SAB	BT	10	15	MID	L	CL
451	10YR	2	1	10YR	4	4	ND	ND	ND	SL	ND	MASS	BM	10	15	LOW	L	L
452	10YR	2	1	10YR	4	3	10YR	5	2	SL	ND	MASS	BM	5	13	LOW	L	L

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
443	ND	28.2	39.0	32.8	CL	CL	21.0	34.0	13.0	15.6	ND	.8	5.2	7.3	2.72
444	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.0	ND	11.81
445	ND	20.1	43.0	36.9	CL	CL	23.0	37.0	14.0	28 5	ND	.4	6.2	7.5	13.69
446	ND	30.8	38.2	31.0	CL	CL	21.0	34.0	13.0	21.9	ND	.4	6.3	7.5	10.01
447	ND	30.7	36.7	32 6	CL	CL	18.0	28.0	10.0	23.8	ND	.4	5.6	7.5	6.14
448	ND	61.2	17.6	21.2	SCL	SC	NP	NL	ND	23 8	ND	.5	5.4	7.3	9.28
449	ATL	14.9	53 0	32 1	SICL	CL	23.0	33.0	10.0	23.3	ND	.5	5.6	7.5	8.38
450	ND	20.4	42 0	37.6	CL	ML	25.0	37.0	12.0	19.6	ND	.4	5.9	7.6	7.73
451	PUP	23.1	44 3	32 6	CL	CL	19.0	31.0	12.0	6 0	ND	.4	6.3	7.3	8.99
452	DVG	5.1	58.6	36.3	SICL	CL	23.0	36.0	13.0	26 7	ND	.4	6.0	7.6	7.43

UNIT MDAD
U.NO 1
UTN 73
T.NO 1
TWP 21
R 28
DIR W
MER 4
TLEN 840
INT 120
NOBS 7

URN	SER	CON	STAT	SG	GG	ORD	P1 M	P1 T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
507	ADY	NCON	REC	O	BL	CHER	TILL	FM	L	ND	ND	ND	ND	12	ND	ND	11	23
508	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FL	L	ND	16	ND	ND	34	50
509	RKV	LCON	REC	O	BL	CHER	EOL	FM	ND	TILL	FL	L	ND	16	ND	ND	22	38
510	MDP	NCON	REC	O	BL	CHER	FG	MS	ND	ND	ND	ND	ND	21	ND	ND	44	65
511	ADY	NCON	REC	O	BL	CHER	TILL	FL	L	ND	ND	ND	ND	15	ND	ND	15	30
512	MDP	NCON	REC	O	BL	CHER	FG	MS	ND	ND	ND	ND	ND	26	ND	ND	39	65
513	ADY	NCON	REC	O	BL	CHER	TILL	FM	L	ND	ND	ND	ND	13	ND	ND	10	23

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
507	10YR	3	1	10YR	4	3	10YR	5	3	W	M	PR	BM	2	2	LOW	L	SICL
508	10YR	2	1	10YR	4	2	10YR	5	3	WM	M	PR	BM	ND	3	LOW	L	SICL
509	10YR	2	1	10YR	4	2	10YR	5	3	W	M	PR	BM	ND	2	TOE	L	L
510	10YR	2	1	10YR	4	4	10YR	6	3	W	M	PR	BM	ND	4	MID	SIL	SIL
511	10YR	2	1	10YR	4	4	10YR	5	2	WM	M	PR	BM	5	3	UP	SIL	SICL
512	10YR	2	1	10YR	4	4	10YR	5	3	W	M	PR	BM	ND	3	LOW	SIL	SIL
513	10YR	3	2	10YR	4	3	10YR	6	3	SL	ND	MASS	BM	5	4	CR	SIL	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
507	ADY	12.8	44 9	42 2	C.	ML	27.0	43.0	16.0	30 1	ND	.5	5.6	7.7	4.31
508	RKV	19.8	48 5	31 7	SICL	CL	20.0	32.0	12.0	24 2	ND	.6	5.6	7.7	6.47
509	RKV	27 4	42 1	30 5	SICL	CL	20.0	28.0	8.0	29 1	ND	3.5	5.5	8.0	5.20
510	MDP	26.9	42 6	30 5	SICL	CL	19.0	26.0	7.0	25 7	ND	.4	5.3	7.7	5.37
511	ADY	25.2	34 8	29 9	CL	CL	18.0	34 0	16.0	14 4	ND	.5	5.8	7.7	4.47
512	MDP	26.4	47 7	25 9	SIL	CL	19.0	25.0	6.0	21 6	ND	.5	6.4	7.7	5 00
513	ADY	25 7	36 6	37 7	CL	CL	19.0	35.0	16.0	12 6	ND	.5	5.4	7 7	3.62

UNIT RSN
U.NO 1
UTN 9
T.NO 1
TWP 22
R 3
DIR W
MER 5
TLEN 960
INT 120
NOBS 8

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2 M	P2 T	P2.S	LFHT	AH T	AHET	AE.T	B.TH	LIME
44	ND	LCON	REC	D	GL	LUV	TILL	FC	C	ND	ND	ND	ND	7	7	10	64	88
45	ND	LCON	REC	D	GL	LUV	TILL	FC	C	ND	ND	ND	ND	9	10	12	71	102
46	RSN	NCON	REC	O	GL	LUV	TILL	FC	C	ND	ND	ND	2	ND	5	8	65	78
47	ND	LCON	REC	D	GL	LUV	TILL	FL	C	ND	ND	ND	2	ND	13	7	50	70
48	ND	LCON	REC	D	GL	LUV	TILL	FL	C	ND	ND	ND	ND	10	9	10	51	80
49	RSN	HCON	REC	O	GL	LUV	TILL	FL	C	ND	ND	ND	5	ND	3	15	46	64
50	ND	LCON	REC	D	GL	LUV	LC	FC	ND	TILL	FC	C	2	7	10	10	22	49
51	RSN	NCON	REC	O	GL	LUV	TILL	FL	C	ND	ND	ND	3	ND	2	15	61	78

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
44	10YR	5	2	10YR	5	3	2.5Y	4	4	ST	FM	AB	BT	4	4	MID	L	C
45	10YR	4	2	10YR	5	3	2.5Y	4	4	ST	FM	AB	BT	4	3	UP	L	C
46	10YR	3	2	10YR	4	3	2.5Y	4	4	ST	FM	AB	BT	4	2	UP	L	C
47	10YR	3	3	10YR	4	3	10YR	5	3	ST	FM	SAB	BT	4	11	UP	L	C
48	10YR	3	3	10YR	4	3	10YR	5	3	ST	FM	SAB	BT	10	12	UP	L	C
49	10YR	4	2	10YR	4	2	2.5Y	5	2	ST	FM	SAB	BT	5	3	CR	L	HC
50	10YR	3	2	2.5Y	3	2	2.5Y	3	2	ST	FM	SAB	BT	2	3	UP	CL	HC
51	10YR	5	4	10YR	4	3	2.5Y	3	2	ST	FM	SAB	BT	4	12	MID	L	HC

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
44	ND	13.9	43.5	42.6	SIC	CL	19.0	34.0	15.0	10 2	ND	ND	5.6	7.4	3.95
45	ND	5.0	47.9	47.1	SIC	CL	21 0	44.0	23.0	1.4	ND	ND	5.2	7.1	3.04
46	RSN	9.1	49 0	41.8	SIC	CL	19.0	35.0	16.0	14.6	ND	ND	ND	7.5	ND
47	ND	8.9	50 1	41.0	SIC	CL	18.0	34 0	16.0	13.8	ND	ND	4.9	7.5	5.23
48	ND	20.5	43.1	36.4	CL	CL	20.0	32.0	12.0	2.0	ND	ND	5.7	7.2	3.44
49	RSN	1.1	39.3	59.6	SIC	CL	23 0	48 0	25 0	14.8	ND	ND	5.0	7.5	3.40
50	ND	.0	26.0	74.0	HC	CH	25.0	57.0	32.0	16 5	ND	ND	6.1	7.6	2.93
51	RSN	1 8	38 5	59.7	SIC	CL	23.0	46.0	23 0	7 0	ND	ND	4.9	7.4	2.42

UNIT RSN
U NO 1
UTN 10
T.NO 2
TWP 22
R 4
DIR W
MER 5
TLEN 600
INT 120
NOBS 5

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1 T	P1 S	P2 M	P2 T	P2 S	LFHT	AH T	AHET	AE.T	B.TH	LIME
52	SPR	LCON	NREC	O	GL	LUV	TILL	FL	C	ND	ND	ND	5	ND	ND	17	63	80
53	RSN	NCON	REC	O	GL	LUV	TILL	FC	C	ND	ND	ND	5	ND	ND	14	ND	ND
54	PUP	MCON	NREC	R	BL	CHER	COL	FC	ND	TILL	FC	C	10	ND	20	ND	44	64
55	ND	MCON	NREC	D	GL	LUV	TILL	FL	C	RES	MS	ND	ND	9	10	15	66	100
56	SPR	LCON	NREC	O	GL	LUV	TILL	FL	C	ND	ND	ND	8	ND	ND	20	60	80

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
52	10YR	5	4	10YR	4	4	10YR	4	4	MS	FM	SAB	BT	15	25	LOW	SIL	CL
53	10YR	5	4	10YR	4	2	10YR	4	4	ST	FM	SAB	BT	5	10	MID	SIL	C
54	10YR	3	2	10YR	3	1	2.5Y	4	2	M	FM	GRAN	BM	3	3	TOE	L	C
55	10YR	3	2	10YR	4	3	10YR	5	4	ST	FM	SAB	BT	ND	10	MID	L	CL
56	10YR	5	4	10YR	4	2	10YR	4	4	ST	FM	SAB	BT	10	10	MID	SIL	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
52	SPR	22 8	38 6	38.6	CL	CL	19 0	34 0	15 0	2	ND	ND	4.8	5.8	.88
53	RSN	20 7	33 1	46.2	C.	CL	20.0	36 0	16 0	0	ND	ND	5.0	5.8	1.57
54	PUP	20 4	44 5	31.5	CL	CL	19 0	33 0	14 0	6 6	ND	ND	6.2	7.4	5.62
55	ND	14 8	60 5	24.7	SIL	CL	22 0	28 0	6 0	6 4	ND	ND	5.3	7.4	4 97
56	SPR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

UNIT RSN
U.NO 1
UTN 15
T.NO 5
TWP 22
R 3
DIR W
MER 5
TLEN 720
INT 120
NOBS 6

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
98	ELB	LCON	NREC	0	GL	LUV	LG	FC	ND	ND	ND	ND	5	ND	2	10	55	67
99	ELB	LCON	NREC	0	GL	LUV	LG	FC	ND	ND	ND	ND	ND	ND	1	12	42	55
100	ND	HCON	NREC	0	BL	CHER	COL	FL	ND	LG	FC	ND	ND	40	ND	ND	33	73
101	ND	HCON	NREC	R	DG	CHER	LG	FC	ND	ND	ND	ND	ND	ND	17	ND	ND	47
102	ELB	LCON	NREC	0	GL	LUV	LG	FC	ND	ND	ND	ND	ND	4	ND	6	37	47
103	ND	LCON	NREC	0	DG	CHER	TILL	FC	ND	ND	ND	ND	6	4	14	ND	40	64

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
98	10YR	4	2	10YR	4	2	10YR	5	3	MS	F	SAB	BT	ND	2	ND	SIL	HC
99	10YR	3	3	10YR	4	2	10YR	5	2	ST	FM	SAB	BT	ND	3	UP	SICL	HC
100	10YR	2	1	10YR	3	2	10YR	5	2	MS	F	SAB	BM	ND	18	TOE	SICL	C
101	10YR	3	2	ND	ND	ND	2.5Y	5	2	ND	ND	ND	ND	ND	3	LOW	L	ND
102	10YR	3	2	10YR	4	2	2.5Y	5	2	MS	F	SAB	BT	ND	3	MID	SICL	HC
103	10YR	3	2	10YR	3	2	2.5Y	4	2	M	F	SAB	BT	ND	22	MID	SICL	HC

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
98	ELB	1.1	46.5	52.4	SIC	CL	20.0	39.0	19.0	19.3	ND	ND	5.2	7.6	1.63
99	ELB	0	45.7	54.3	SIC	CL	20.0	39.0	19.0	26.8	ND	ND	5.2	7.6	2.30
100	ND	3.0	40.7	56.3	SIC	CL	22.0	44.0	22.0	12.6	ND	ND	6.4	7.5	4.10
101	ND	26.2	37.8	36.0	CL	CL	17.0	27.0	10.0	31.0	ND	ND	5.7	7.7	4.79
102	ELB	2.3	47.1	50.5	SIC	CL	22.0	42.0	20.0	29.5	ND	ND	5.2	7.7	3.02
103	ND	10.4	40.8	48.9	SIC	ND	ND	ND	ND	11.9	ND	ND	5.4	7.3	4.97

UNIT RSN
U.NO 1
UTN 20
T.NO 8
TWP 21
R 3
DIR W
MER 5
TLEN 1080
INT 120
NOBS 9

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
132	ND	LCON	NREC	0	GL	LUV	LG	FC	ND	TILL	FC	C	5	ND	4	3	43	50
133	POT	HCON	REC	0	HG	GLEY	TILL	FC	C	ND	ND	ND	10	16	ND	ND	29	45
134	ND	MCON	NREC	0	DG	CHER	LG	FC	ND	TILL	FC	C	6	ND	22	ND	30	58
135	POT	HCON	REC	R	HG	GLEY	LG	FC	ND	ND	ND	ND	6	18	ND	ND	ND	0
136	ND	LCON	NREC	0	DG	CHER	LG	FC	ND	ND	ND	ND	ND	37	ND	ND	25	62
137	ND	LCON	NREC	0	DG	CHER	TILL	FC	C	ND	ND	ND	10	ND	12	ND	51	63
138	ND	LCON	NREC	0	DG	CHER	LG	FC	ND	ND	ND	ND	6	ND	27	ND	53	80
139	ND	LCON	NREC	0	GL	LUV	LG	FC	ND	ND	ND	ND	8	ND	6	ND	49	55
140	PUP	HCON	NREC	0	BL	CHER	COL	FL	ND	LG	FC	ND	ND	60	ND	ND	40	ND

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
132	10YR	3	2	10YR	4	2	2.5Y	4	4	ST	FM	SAB	BT	30	6	MID	SIL	HC
133	10YR	2	1	2.5Y	5	1	2.5Y	3	2	ST	F	SAB	BT	3	10	LOW	C	HC
134	10YR	3	2	10YR	4	2	2.5Y	3	2	M	F	SAB	BT	2	10	CR	C	HC
135	10YR	2	.	ND	ND	ND	2.5Y	5	4	ND	ND	ND	ND	1	6	LOW	C	ND
136	10YR	3	1	10YR	3	2	10YR	4	1	M	FM	GRAN	BM	1	8	MID	C	HC
137	10YR	3	2	10YR	4	2	2.5Y	4	4	ST	FM	SAB	BT	1	6	MID	C	HC
138	10YR	3	1	10YR	4	2	2.5Y	4	2	ST	FM	SAB	BT	ND	8	MID	C	HC
139	10YR	3	2	2.5Y	4	2	2.5Y	4	2	ST	F	SAB	BT	ND	10	TOE	C	HC
140	10YR	2	1	2.5Y	4	2	ND	ND	ND	SL	ND	MASS	BC	2	13	TOE	C	HC

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
132	ND	22.9	27.0	50.2	C	CL	25.0	49.0	24.0	6.0	ND	ND	5.4	6.9	2.56
133	POT	15.5	35.5	49.1	C	CL	21.0	42.0	21.0	3.3	ND	ND	5.7	7.1	6.16
134	ND	16.6	34.8	48.6	C	CL	23.0	41.0	18.0	14.1	ND	ND	6.2	7.4	5.88
135	POT	0	50.5	49.5	SIC	CL	22.0	42.0	20.0	14.1	55	ND	6.9	7.7	8.38
136	ND	6.0	41.2	52.8	SIC	CH	32.0	56.0	24.0	1.3	34	ND	6.5	7.4	6.59
137	ND	3.5	36.0	60.6	HC	CL	22.0	45.0	23.0	9.0	ND	ND	6.3	7.4	4.83
138	ND	0	24.2	75.8	HC	CH	27.0	55.0	32.0	11.7	ND	ND	4.7	7.6	5.85
139	ND	0	31.8	68.2	HC	CH	26.0	57.0	31.0	5.8	ND	ND	5.[illegible]	7.3	5.80
140	PUP	0	31.2	68.8	HC	CH	27.0	58.0	31.0	1.3	ND	ND	4.3	7.2	5.78

UNIT SPR
U.NO 1
UTN 3
T.NO 31
TWP 21
R 4
DIR W
MER 5
TLEN 1560
INT 120
NOBS 13

URN	SER	CON	STAT	SG	GG	ORD	P1 M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH T	AHET	AE T	B.TH	LIME
10	SPR	NCON	REC	0	GL	LUV	TILL	FL	C	ND	ND	ND	5	ND	ND	17	38	55
11	SPR	NCON	REC	0	GL	LUV	TILL	FL	C	ND	ND	ND	ND	ND	ND	16	46	61
12	MSB	HCON	REC	0	EB	BRUN	COL	MS	ND	RES	FL	ND	3	ND	ND	ND	7	7
13	ND	LCON	REC	0	GL	LUV	TILL	FL	C	COL	MS	ND	3	ND	ND	10	19	29
14	SPR	NCON	REC	0	GL	LUV	TILL	FL	C	ND	ND	ND	5	ND	ND	11	39	50
14	SPR	HCON	REC	0	GL	LUV	TILL	FL	C	ND	ND	ND	5	ND	ND	11	39	50
15	SPR	NCON	REC	0	GL	LUV	TILL	FL	C	ND	ND	ND	4	ND	ND	20	30	50
16	SPR	NCON	REC	0	GL	LUV	TILL	FL	C	ND	ND	ND	3	ND	ND	22	28	55
17	SPP	NCON	REC	0	GL	LUV	TILL	FL	C	ND	ND	ND	3	ND	ND	21	23	44
18	MSB	HCON	REC	0	EB	BRUN	COL	MS	ND	ND	ND	ND	3	ND	ND	ND	13	40
19	ND	MCON	REC	0	GL	LUV	TILL	FL	C	ND	ND	ND	3	ND	9	5	46	60
20	SPR	NCON	REC	0	GL	LUV	TILL	FL	C	ND	ND	ND	3	ND	ND	20	40	60
21	SPR	NCON	REC	0	GL	LUV	TILL	FL	C	ND	ND	ND	3	ND	3	24	56	80
622	SPR	NCON	REC	0	GL	LUV	TILL	FC	C	ND	ND	ND	3	ND	ND	22	58	80

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF C	SLOP	SL.P	ATEX	BTEX
10	10YR	6	3	10YR	4	4	2.5Y	4	2	MS	F	SAB	BT	10	35	MID	SIL	CL
11	10YR	6	3	10YR	4	3	2.5Y	4	4	MS	F	SAB	BT	20	35	MID	SIL	CL
12	ND	ND	ND	10YR	3	3	10YR	4	3	WM	F	GRAN	BM	50	50	UP	ND	SL
13	10YR	5	3	10YR	5	4	10YR	4	4	WM	F	SAB	BT	30	35	CR	SIL	CL
14	10YR	5	3	10YR	4	4	2.5Y	4	4	MS	FM	SAB	BT	35	20	LOW	SL	CL
14	10YR	5	3	10YR	4	4	2.5Y	4	4	MS	FM	SAB	BT	35	20	LOW	SL	CL
15	10YR	6	4	10YR	4	4	10YR	5	2	MS	F	SAB	BT	35	40	MID	SIL	L
16	10YR	6	3	10YR	4	3	2.5Y	4	2	MS	F	SAB	BT	20	15	UP	SL	CL
17	10YR	6	4	10YR	4	3	2.5Y	4	2	MS	F	SAB	BT	20	40	UP	SL	CL
18	ND	ND	ND	10YR	4	2	10YR	6	3	SL	ND	SGR	BM	60	75	UP	ND	SL
19	10YR	3	3	10YR	4	3	2.5Y	4	2	WM	F	SAB	BT	10	23	LOW	SIL	CL
20	10YR	6	3	10YR	4	3	2.5Y	4	4	MS	F	SAB	BT	25	40	MID	SL	CL
21	10YR	6	3	10YR	4	3	2.5Y	4	2	ST	FM	SAB	BT	15	30	LOW	SIL	CL
622	10YR	6	3	10YR	4	3	2.5Y	4	2	MS	F	SAB	BT	15	30	MID	SIL	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
10	SPR	23.9	34.2	41.9	C	CL	19.0	36.0	17.0	3	ND	ND	4.6	5.4	.92
11	SPR	32.3	34.7	33.0	CL	CL	19.0	32.0	13.0	4.3	ND	ND	5.0	7.1	1.08
12	MSB	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	5.4	6.2	3.23
13	ND	21.2	48.3	30.6	CL	CL	20.0	36.0	16.0	1.6	ND	ND	6.1	7.1	2.72
14	SPR	27.5	34.5	38.0	CL	CL	20.0	35.0	15.0	1	ND	ND	5.0	6.1	1.50
14	SPR	27.5	34.5	38.0	CL	CL	20.0	35.0	15.0	1	ND	ND	5.0	6.1	1.50
15	SPR	23.7	35.6	35.7	CL	CL	20.0	35.0	15.0	5.3	ND	ND	4.5	7.0	1.09
16	SPR	17.5	37.5	45.1	C	CL	20.0	38.0	18.0	1	ND	ND	4.7	6.2	.87
17	SPP	21.2	49.0	29.9	CL	CL	23.0	39.0	16.0	2	ND	ND	5.1	6.1	1.71
18	MSB	61.5	23.7	14.8	SL	SM	NP	NL	ND	1	ND	ND	5.3	6.5	2.35
19	ND	20.2	41.1	38.6	CL	CL	22.0	36.0	14.0	1.4	ND	ND	5.1	6.8	2.88
20	SPR	39.9	28.9	31.2	L	CL	18.0	30.0	12.0	1	ND	ND	5.0	5.7	1.21
21	SPR	ND	ND	ND	ND	ND	ND	ND	ND	MS	ND	MS	MS	MS	MS
622	SPR	ND	ND	ND	ND	ND	ND	ND	ND	MS	ND	MS	MS	MS	MS

UNIT SPR
U.NO 1
UTN 6
T.NO 34
TWP 21
R 4
DIR W
MER 5
TLEN 720
INT 120
NOBS 6

URN	SER	CON	STAT	SG	GC	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
28	ND	LCON	NREC	O	GL	LUV	TILL	FL	C	RES	FL	ND	5	ND	2	17	63	80
29	ND	LCON	NREC	O	GL	LUV	TILL	FL	C	RES	FL	ND	4	ND	ND	15	ND	ND
30	ND	MCON	NREC	O	GL	LUV	RES	FL	ND	ND	ND	ND	5	ND	ND	17	33	50
31	RSN	MCON	NREC	O	GL	LUV	TILL	FL	C	RES	FL	ND	3	ND	ND	20	ND	ND
32	ND	HCON	NREC	O	MB	BRUN	COL	FL	ND	TILL	FL	C	5	ND	45	ND	40	85
33	RSN	LCON	NREC	O	GL	LUV	TILL	FC	C	ND	ND	ND	4	ND	3	20	37	60

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
28	10YR	6	3	10YR	5	3	ND	ND	ND	WM	F	SAB	BT	15	25	MID	SL	SICL
29	10YR	6	3	10YR	5	3	ND	ND	ND	WM	F	SAB	BT	2	35	CR	SIL	CL
30	10YR	6	3	10YR	5	3	10YR	5	2	WM	F	SAB	BT	2	35	CR	SIL	SICL
31	10YR	6	3	10YR	5	2	10YR	5	2	M	MC	SAB	BT	ND	25	UP	SIL	CL
32	10YR	3	1	10YR	4	2	ND	ND	ND	WM	M	GRAN	BM	3	28	MID	CL	CL
33	10YR	4	1	10YR	4	2	2.5Y	4	2	ST	M	SAB	BT	3	15	LOW	CL	C

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	AC03	EC	PHA	PHC	CARB
28	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.9	5.9	1.29
29	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.1	ND	2.36
30	ND	15.5	46.7	35.8	SICL	CL	17.0	27.0	10.0	.5	ND	ND	5.0	6.6	.96
31	RSN	.0	24.6	75.4	HC	CH	32.0	68.0	36.0	.0	ND	ND	5.2	5.9	1.09
32	ND	21.3	41.4	37.3	CL	CL	22.0	31.0	9.0	.1	ND	ND	5.1	5.2	5.91
33	RSN	.9	38.7	60.5	HC	CL	23.0	49.0	26.0	.1	ND	ND	5.3	6.5	2.29

UNIT SPR
U.NO 1
UTN 7
T.NO 67
TWP 21
R 4
DIR W
MER 5
TLEN 600
INT 120
NOBS 5

URN	SER	CON	STAT	SG	GC	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
34	ELB	NCON	NREC	O	GL	LUV	LG	FC	ND	TILL	FL	C	4	ND	9	3	35	100
35	ND	MCON	NREC	O	GL	LUV	COL	FL	ND	ND	ND	ND	3	ND	ND	18	52	70
36	ND	MCON	NREC	E	EB	BRUN	COL	FL	ND	ND	ND	ND	3	ND	ND	11	20	ND
37	ND	HCON	REC	O	R	REGO	COL	FL	ND	ND	ND	ND	3	ND	ND	10	ND	ND
38	ND	HCON	REC	O	R	REGO	COL	FL	ND	ND	ND	ND	3	ND	ND	10	ND	ND

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF C	SLOP	SL P	ATEX	BTEX
34	10YR	3	2	10YR	3	1	2.5Y	4	2	ST	FM	SAB	BT	ND	20	LOW	CL	HC
35	10YR	3	3	10YR	3	2	10YR	3	2	MS	F	SAB	BT	3	40	MID	L	CL
36	10YR	7	1	10YR	3	2	10YR	3	2	W	F	SAB	BM	30	45	MID	SL	CL
37	75YR	5	3	ND	ND	ND	10YR	6	2	ND	ND	ND	ND	70	25	CR	SL	ND
38	10YR	5	3	ND	ND	ND	10YR	5	2	ND	ND	ND	ND	50	20	LOW	SL	ND

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	AC03	EC	PHA	PHC	CARB
34	ELB	.0	25.2	74.8	HC	CH	27.0	61.0	34.0	1.0	ND	ND	5.1	6.8	6.04
35	ND	10.1	53.2	36.7	SICL	CL	20.0	32.0	12.0	2.0	ND	ND	5.1	6.8	6.04
36	ND	10.1	57.8	32.0	C.	CL	19.0	26.0	7.0	.0	ND	ND	4.9	4.6	1.12
37	ND	26.6	50.5	22.8	SIL	CL	18.0	23.0	5.0	.0	ND	ND	4.2	4.8	1.35
38	ND	24.9	48.4	26.6	SIL	CL	18.0	24.0	6.0	.0	ND	ND	4.5	4.7	.99

UNIT SPR
U.NO 1
UTN 19
T.NO 9
TWP 22
R 3
DIR W
MER 5
TLEN 480
INT 120
NOBS 4

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1 T	P1 S	P2.M	P2 T	P2.S	LFHT	AH T	AHET	AE.T	B.TH	LIME
128	SPR	NCON	REC	O	GL	LUV	TILL	FL	C	ND	ND	ND	7	ND	4	6	23	ND
129	SPR	NCON	REC	O	GL	LUV	TILL	FL	C	ND	ND	ND	7	ND	5	9	24	ND
130	ND	LCON	REC	E	EB	BRUN	TILL	FL	C	ND	ND	ND	6	ND	3	ND	30	ND
131	ND	LCON	NREC	O	GL	LUV	TILL	FM	C	ND	ND	ND	3	ND	4	5	26	ND

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
128	10YR	4	3	10YR	4	4	10YR	4	4	W	F	SAB	BT	10	6	UP	SIL	CL
129	10YR	3	3	10YR	4	4	10YR	5	4	WM	FM	SAB	BT	10	10	MID	SIL	CL
130	10YR	4	4	10YR	4	4	10YR	6	4	WM	F	SAB	BM	15	20	CR	L	CL
131	10YR	4	4	10YR	4	3	10YR	5	6	W	FM	SAB	BT	1	25	CR	SL	SCL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
128	SPR	28.5	36.5	35.0	CL	CL	19.0	30.0	11.0	.0	ND	ND	4.6	5.4	1.38
129	SPR	29.3	36 1	34.6	CL	CL	19.0	27.0	8.0	.6	ND	ND	4.3	5.3	3.44
130	ND	38.4	37.1	24.5	L	CL	21.0	32.0	11.0	.6	ND	ND	4.7	5.3	1.79
131	ND	22.9	27.0	50.2	C.	CL	18.0	28.0	10.0	.6	ND	ND	5.0	6.6	2.00

UNIT SPR
U.NO 1
UTN 23
T.NO 24
TWP 22
R 4
DIR W
MER 5
TLEN 960
INT 120
NOBS 8

URN	SER	CON	STAT	SG	GG	ORD	P1 M	P1 T	P1 S	P2.M	P2 T	P2 S	LFHT	AH T	AHET	AE T	B.TH	LIME
156	ND	HCON	NREC	GL	BL	CHER	LG	FC	ND	ND	ND	ND	14	15	ND	ND	31	46
157	SPR	NCON	REC	O	GL	LUV	TILL	FL	C	ND	ND	ND	4	ND	ND	22	38	60
158	SPR	NCON	REC	O	GL	LUV	TILL	FL	C	ND	ND	ND	3	ND	2	32	99	ND
159	SPR	NCON	REC	O	GL	LUV	TILL	FL	C	ND	ND	ND	4	ND	2	13	99	ND
160	SPR	NCON	REC	O	GL	LUV	TILL	FL	C	ND	ND	ND	4	ND	ND	14	99	ND
161	SPR	NCON	REC	O	GL	LUV	TILL	FL	C	ND	ND	ND	3	ND	ND	23	57	80
162	SPR	NCON	REC	O	GL	LUV	TILL	FL	C	ND	ND	ND	7	ND	ND	22	99	ND
163	SPR	NCON	REC	O	GL	LUV	TILL	FL	C	ND	ND	ND	5	ND	ND	13	47	60

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
156	10YR	2	1	10YR	4	1	2.5Y	5	2	ST	FM	GRAN	BM	2	2	TOE	C	HC
157	10YR	4	3	10YR	5	3	10YR	5	3	ST	F	SAB	BT	15	ND	MID	L	CL
158	10YR	5	4	10YR	4	4	10YR	4	3	ST	FM	SAB	BT	20	40	UP	L	CL
159	10YR	5	4	10YR	4	4	10YR	4	2	WM	F	SAB	BT	30	5	CR	L	CL
160	75YR	5	4	10YR	5	4	ND	ND	ND	MS	FM	SAB	BT	15	10	CR	L	CL
161	10YR	6	4	10YR	4	3	10YR	5	2	ST	FM	SAB	BT	20	25	UP	SIL	CL
162	75YR	5	4	10YR	4	3	ND	ND	ND	ST	FM	SAB	BT	25	16	MID	SL	CL
163	75YR	4	4	10YR	4	3	10YR	4	2	ST	FM	SAB	BT	15	16	TOE	SL	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
156	ND	.0	31.1	68.9	HC	CH	26.0	61.0	35.0	2.4	ND	ND	6.3	7.4	4.08
157	SPR	28.2	29.5	42.4	C.	CL	19.0	35.0	16.0	.2	ND	ND	5.0	5.8	1.35
158	SPR	35.3	31.9	32.8	CL	CL	18.0	31 0	13.0	.0	ND	ND	5.3	6.4	93
159	SPR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.5	ND	2.50
160	SPR	17.6	37.0	45 4	C.	CL	22 0	41.0	19.0	.1	ND	ND	5.0	6 0	1 44
161	SPR	22.2	42.1	35.7	CL	CL	21.0	34.0	13.0	8.9	ND	ND	5.6	7.4	1.11
162	SPR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.1	ND	99
163	SPR	21.3	38.6	40 1	C.	CL	23.0	45.0	22.0	9.5	ND	ND	5.2	7.2	.92

UNIT SPY
U.NO 1
UTN 24
T.NO 43
TWP 26
R 3
DIR W
MER 5
TLEN 480
INT 120
NOBS 4

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
165	SPY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	25	ND	ND	20	45
166	SPY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	10	ND	ND	6	16
167	SPY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	13	ND	ND	31	44
168	SPY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	14	ND	ND	31	45

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
165	10YR	3	1	10YR	3	3	2.5Y	5	2	MS	M	SAB	BM	10	6	MID	L	CL
166	10YR	3	1	10YR	4	2	10YR	5	3	WM	M	PR	BM	15	9	MID	L	CL
167	10YR	3	1	10YR	3	3	10YR	4	2	WM	M	PR	BM	20	9	UP	L	CL
168	10YR	3	2	10YR	4	4	10YR	5	4	WM	M	PR	BM	25	7	MID	L	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	AC03	EC	PHA	PHC	CARB
165	SPY	9.9	39.0	51.1	C.	CL	22.0	45.0	23.0	20.1	ND	.5	6.1	7.6	6.84
166	SPY	5.0	53.4	41.7	C.	CL	27.0	45.0	18.0	15.6	1.35	.4	6.8	7.7	5.28
167	SPY	4.3	42.7	52.9	C.	CL	24.0	43.0	19.0	17.0	ND	.5	5.8	7.5	7.15
168	SPY	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.7	ND	6.33

UNIT SPY
U.NO 1
UTN 25
T.NO 9
TWP 25
R 2
DIR W
MER 5
TLEN 720
INT 120
NOBS 6

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1 S	P2 M	P2 T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
169	ND	MCON	NREC	O	BL	CHER	FG	MS	ND	TILL	FL	M	ND	12	ND	ND	20	32
170	ND	LCON	REC	R	BL	CHER	TILL	FL	M	ND	ND	ND	ND	11	ND	ND	ND	0
171	ND	HCON	NREC	GL	BL	CHER	COL	FL	ND	TILL	FL	M	ND	17	ND	ND	38	55
172	ND	HCON	NREC	GL	BL	CHER	COL	FL	ND	TILL	FL	M	ND	50	ND	ND	35	85
173	SPY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	10	ND	ND	23	33
174	SPY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	12	ND	ND	30	30

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
169	10YR	3	2	10YR	3	3	10YR	5	4	W	C	PR	BM	1	12	CR	L	SL
170	10YR	3	2	ND	ND	ND	10YR	4	3	ND	ND	ND	ND	30	32	CR	L	ND
171	10YR	3	1	10YR	4	2	10YR	5	2	SL	ND	MASS	BC	20	1	DEP	CL	SICL
172	10YR	3	2	10YR	5	3	10YR	4	2	SL	ND	MASS	BC	10	1	DEP	L	SICL
173	10YR	3	2	10YR	4	3	10YR	5	3	W	MC	PR	BM	30	16	UP	L	L
174	10YR	3	2	10YR	4	3	10YR	6	3	W	MC	PR	BM	30	25	MID	L	L

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	AC03	EC	PHA	PHC	CARB
169	ND	41.7	32.5	25.7	L	CL	23.0	30.0	7.0	18.1	ND	.7	6.0	7.4	7.97
170	ND	51.5	34.1	14.5	L	CL	42.0	46.0	4.0	21.5	1.52	.8	6.6	7.4	6.63
171	ND	28.6	36.6	34.7	CL	CL	17.0	30.0	13.0	13.5	.59	.4	6.5	7.6	4.48
172	ND	5.9	48.0	46.1	SIC	CL	23.0	41.0	18.0	5.7	ND	.6	6.4	7.3	7.94
173	SPY	11.8	49.8	38.3	SICL	CL	29.0	42.0	13.0	18.6	ND	.6	6.0	7.4	10.37
174	SPY	15.2	42.5	42.2	SIC	CL	20.0	36.0	16.0	20.8	ND	1.3	6.1	7.6	6.09

UNIT SPY
U.NO 1
UTN 26
T.NO 17
TWP 25
R 3
DIR W
MER 5
TLEN 600
INT 120
NOBS 5

URN	SER	CON	STAT	SG	GG	ORD	P1 M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE T	B.TH	LIME
175	SPY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	15	ND	ND	15	30
176	SPY	NCON	REC	O	BL	CHER	TILL	FM	M	ND	ND	ND	ND	16	ND	ND	16	34
177	ND	LCON	REC	R	BL	CHER	TILL	FL	M	ND	ND	ND	4	15	ND	ND	5	15
178	SPY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	11	ND	ND	39	50
179	SPY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	13	ND	ND	20	33

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF C	SLOP	SL.P	ATEX	BTEX
175	10YR	3	1	10YR	3	3	10YR	5	4	WM	M	PR	BM	20	9	TOE	L	L
176	10YR	3	1	10YR	5	3	10YR	5	2	WM	M	PR	BM	5	3	CR	L	L
177	10YR	3	1	10YR	4	2	10YR	5	2	W	M	PR	BMK	30	4	CR	L	ND
178	10YR	3	1	10YR	5	3	2.5Y	6	2	M	MC	PR	BM	25	4	MID	L	L
179	10YR	3	1	10YR	4	3	10YR	5	3	M	MC	PR	BM	25	10	MID	L	L

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
175	SPY	14.4	44.7	40.9	SIC	CL	22.0	37.0	15.0	3.2	.85	ND	6.7	7.0	9.30
176	SPY	19.4	46.1	34.5	SICL	CL	21.0	32.0	11.0	32.6	.46	.7	6.7	7.8	6.53
177	ND	8.5	46.4	45.1	SIC	CL	25.0	42.0	17.0	20.8	ND	1.0	7.1	7.7	7.86
178	SPY	18.8	43.9	37.3	SICL	CL	23.0	38.0	15.0	17.7	.68	.8	6.9	7.6	10.09
179	SPY	20.5	40.1	39.4	CL	CL	17.0	29.0	12.0	17.0	.80	1.1	7.0	7.8	7.31

UNIT SPY
U.NO 1
UTN 27
T.NO 33
TWP 25
R 2
DIR W
MER 5
TLEN 1080
INT 120
NOBS 9

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1 T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
180	SPY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	2	9	ND	ND	7	16
181	SPY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	15	ND	ND	37	52
182	SPY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	17	ND	ND	47	64
183	SPY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	10	ND	ND	25	35
184	ND	MCON	NREC	O	GL	LUV	TILL	FL	M	ND	ND	ND	ND	10	5	20	ND	ND
185	SPY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	15	ND	ND	35	50
186	SPY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	10	ND	ND	20	30
187	ND	HCON	REC	O	HG	GLEY	TILL	FL	M	ND	ND	ND	ND	18	ND	ND	37	55
188	ND	LCON	NREC	O	MB	BRUN	TILL	FL	M	ND	ND	ND	ND	4	ND	ND	9	15

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF C	SLOP	SL.P	ATEX	BTEX
180	10YR	3	1	10YR	3	3	10YR	5	3	W	MC	PR	BM	30	12	CR	L	L
181	10YR	3	1	10YR	3	2	10YR	5	3	M	MC	PR	BM	20	10	MID	L	L
182	10YR	3	1	10YR	4	2	10YR	5	3	M	MC	PR	BM	99	20	LOW	L	CL
183	10YR	3	1	10YR	3	3	10YR	4	3	M	MC	PR	BM	30	16	UP	L	L
184	10YR	4	1	10YR	4	1	2.5Y	5	2	ST	FM	PR	BT	15	2	TOE	L	C
185	10YR	3	1	10YR	5	3	2.5Y	6	4	M	MC	PR	BM	10	1	TOE	L	CL
186	10YR	2	1	10YR	4	2	10YR	5	3	M	MC	PR	BM	25	7	LOW	L	L
187	10YR	2	1	10YR	4	1	2.5Y	5	2	MS	F	SAB	BTG	20	3	LOW	L	C
188	10YR	3	1	10YR	5	4	10YR	5	3	W	C	PR	BM	25	28	CR	L	L

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
180	SPY	21.6	37.5	40 7	CL	CL	29.0	41.0	12.0	23.4	ND	8	6 3	7.5	13 63
181	SPY	24.0	34.3	41 7	C.	CL	24.0	40.0	16 0	11.2	ND	7	6.1	7.3	10.39
182	SPY	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.3	ND	6.07
183	SPY	24.7	37.9	37.4	CL	CL	34 0	49.0	15 0	8.1	ND	8	5.3	7 1	11 58
184	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4 9	ND	14 18
185	SPY	8.0	52.3	39.7	SICL	CL	23.0	37.0	14.0	10.2	ND	6	5.1	7 5	6 43
186	SPY	26.5	33 8	39.6	CL	CL	26.0	41.0	15.0	20 4	ND	ND	5 4	7 4	12.04
187	ND	20.7	34.0	45 4	C	CL	18 0	36.0	18.0	9 9	ND	6	6 1	7.4	11.24
188	ND	32.6	40 1	27.2	L	CL	25.0	36.0	11 0	25 8	ND	7	5.9	7.5	12.31

UNIT SPY
U.NO 1
UTN 28
T.NO 41
TWP 26
R 3
DIR W
MER 5
TLEN 480
INT 120
NOBS 4

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1 T	P1.S	P2.M	P2 T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
189	SPY	NCON	REC	O	BL	CHER	TILL	FC	M	ND	ND	ND	ND	16	ND	ND	43	59
190	SPY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	15	ND	ND	32	47
191	ND	LCON	NREC	O	BL	CHER	COL	FL	ND	TILL	FL	M	ND	45	ND	ND	15	60
192	SPY	NCON	REC	O	BL	CHER	TILL	FL	M	ND	ND	ND	ND	16	ND	ND	30	46

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
189	10YR	2	1	10YR	4	3	10YR	5	3	M	MC	PR	BM	10	9	UP	L	L
190	10YR	2	1	10YR	4	3	10YR	5	2	M	MC	PR	BM	15	3	CR	L	CL
191	10YR	2	1	2.5Y	5	4	2.5Y	6	4	MS	FM	SAB	BM	4	11	TOE	L	CL
192	10YR	2	1	10YR	4	3	10YR	5	3	M	MC	PR	BM	10	5	UP	L	CL

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
189	SPY	6.1	56.4	37.5	SICL	CL	22.0	37.0	15.0	10.9	ND	.9	5.4	7.4	7.71
190	SPY	18.0	44.4	37.6	SICL	CL	21.0	36.0	15.0	10.8	ND	.6	6.0	7.4	13.73
191	ND	13.6	53.1	33.2	SICL	CL	18.0	31.0	13.0	22.5	68	.5	6.5	7.6	10.62
192	SPY	13.4	43.1	43.5	SIC	CL	20.0	37.0	17.0	8.4	ND	.7	5.7	7.2	10.83

UNIT SRC
U.NO 1
UTN 38
T.NO 9
TWP 22
R 3
DIR W
MER 5
TLEN 960
INT 120
NOBS 8

URN	SER	CON	STAT	SG	GG	ORD	P1 M	P1 T	P1 S	P2 M	P2 T	P2 S	LFHT	AH T	AHET	AE.T	B.TH	LIME
237	ND	LCON	REC	CU	HR	REGO	FLU	FL	ND	ND	ND	ND	ND	25	ND	ND	ND	0
238	ND	LCON	REC	CU	HR	REGO	FLU	FL	ND	ND	ND	ND	ND	44	ND	ND	ND	0
239	ND	LCON	REC	R	DG	CHER	FLU	FL	ND	TILL	FL	M	ND	30	ND	ND	4	34
240	ND	MCON	REC	O	HG	GLEY	FLU	FL	ND	ND	ND	ND	ND	15	ND	ND	ND	0
241	ND	LCON	REC	R	DG	CHER	FLU	FM	ND	TILL	FL	M	ND	34	ND	ND	ND	0
242	ND	MCON	REC	O	DG	CHER	FLU	FL	ND	FG	GV	ND	ND	30	ND	ND	30	60
243	ND	MCON	NREC	R	DG	CHER	FLU	FS	ND	FG	GV	ND	ND	30	ND	ND	ND	0
244	ND	LCON	NREC	O	BL	CHER	FLU	FL	ND	FG	GV	ND	ND	17	ND	ND	36	53

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
237	10YR	3	2	ND	ND	ND	10YR	4	2	ND	ND	ND	ND	ND	2	UP	CL	ND
238	10YR	3	2	ND	ND	ND	10YR	5	2	ND	ND	ND	ND	ND	2	UP	CL	ND
239	10YR	2	1	10YR	4	3	10YR	5	3	SL	ND	MASS	BM	ND	1	CR	SIL	L
240	10YR	3	1	ND	ND	ND	10YR	5	1	ND	ND	ND	ND	ND	1	DEP	CL	ND
241	10YR	2	1	ND	ND	ND	10YR	4	1	ND	ND	ND	ND	ND	1	UP	SIL	ND
242	10YR	3	1	10YR	5	2	10YR	4	1	W	MC	PR	BM	60	2	UP	SIL	SCL
243	10YR	3	1	ND	ND	ND	10YR	4	2	ND	ND	ND	ND	60	3	LOW	CL	ND
244	10YR	2	1	10YR	5	2	10YR	5	2	ST	F	SAB	BM	60	3	CR	L	SIC

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
237	ND	19.6	44.8	35.6	SICL	ML	27.0	41.0	14.0	11.6	5.73	ND	7.2	7.8	4.27
238	ND	33.0	36.2	30.9	CL	CL	21.0	31.0	10.0	15.0	5.80	ND	7.1	7.8	6.04
239	ND	22.2	39.3	38.5	CL	CL	21.0	35.0	14.0	22.9	55	ND	7.0	7.8	6.36
240	ND	15.2	41.3	43.4	SIC	CL	25.0	43.0	18.0	13.9	15.56	ND	7.5	7.7	14.05
241	ND	9.3	41.7	49.0	SIC	ML	28.0	48.0	20.0	7.7	17	ND	6.8	7.5	7.23
242	ND	41.0	33.0	26.0	L	ML	31.0	43.0	12.0	7.3	ND	ND	6.1	7.2	7.34
243	ND	47.3	27.8	24.9	SCL	SC	19.0	26.0	7.0	10.[illegible]	2.53	ND	7.2	7.5	6.18
244	ND	47.7	26.0	26.0	SCL	SC	18.0	26.0	8.0	10.9	ND	ND	5.5	7.2	7.12

UNIT SRC
U.NO 1
UTN 39
T.NO 10
TWP 21
R 3
DIR W
MER 5
TLEN 720
INT 120
NOBS 6

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
245	SRC	NCON	REC	O	DG	CHER	FLU	FM	ND	ND	ND	ND	ND	25	ND	ND	110	135
246	SRC	NCON	REC	O	DG	CHER	FLU	FL	ND	ND	ND	ND	ND	20	ND	ND	50	70
247	SRC	NCON	REC	O	DG	CHER	FLU	FM	ND	ND	ND	ND	ND	20	ND	ND	46	66
248	SRC	NCON	REC	O	DG	CHER	FLU	FM	ND	ND	ND	ND	ND	19	ND	ND	11	30
249	ND	MCON	NREC	O	DG	CHER	FLU	FM	ND	FG	GV	ND	ND	12	ND	ND	60	72
250	ND	MCON	NREC	O	DG	CHER	FLU	FM	ND	FG	GV	ND	ND	14	ND	ND	54	68

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
245	10YR	2	1	10YR	4	2	10YR	3	2	W	MC	PR	BM	ND	2	UP	SICL	SIL
246	10YR	3	1	10YR	4	1	10YR	4	2	W	C	PR	BM	ND	1	UP	SIL	L
247	10YR	2	1	10YR	4	2	10YR	4	2	MS	MC	PR	BM	ND	1	UP	SIL	SIL
248	10YR	3	1	10YR	3	2	10YR	4	2	W	MC	PR	BM	ND	1	UP	SIL	SIL
249	10YR	3	1	10YR	3	2	10YR	4	2	M	MC	PR	BM	15	1	UP	SIL	SIL
250	10YR	3	1	10YR	4	1	10YR	4	1	WM	M	PR	BM	60	1	UP	L	L

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	AC03	EC	PHA	PHC	CARB
245	SRC	7.9	63.1	29.0	SICL	CL	21.0	30.0	9.0	4.7	.38	ND	6.5	7.3	5.49
246	SRC	24.9	50.0	25.1	SIC	CL	21.0	29.0	8.0	3.5	ND	ND	6.3	7.4	4.94
247	SRC	9.6	58.4	32.0	SICL	CL	21.0	30.0	9.0	5.0	ND	ND	6.1	7.5	6.37
248	SRC	13.6	59.9	26.5	SIL	ML	24.0	34.0	10.0	3.7	.21	ND	6.5	7.8	5.40
249	ND	45.4	33.7	21.0	L	SC	22.0	31.0	9.0	2.5	ND	ND	6.2	7.3	7.88
250	ND	40.6	37.3	22.0	L	ML	23.0	28.0	5.0	1.7	ND	ND	6.2	7.0	5.85

UNIT SRC
U.NO 1
UTN 40
T.NO 3
TWP 21
R 3
DIR W
MER 5
TLEN 960
INT 120
NOBS 8

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1 T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
251	SCO	MCON	NREC	O	BL	CHER	FLU	FS	ND	FG	GV	ND	ND	28	ND	ND	40	100
252	SCO	HCON	NREC	O	BL	CHER	FG	GV	ND	ND	ND	ND	ND	13	ND	ND	47	60
253	SRC	NCON	REC	O	BL	CHER	FLU	FM	ND	ND	ND	ND	ND	32	ND	ND	30	130
254	SRC	NCON	REC	O	DG	CHER	FLU	FL	ND	ND	ND	ND	ND	43	ND	ND	90	ND
255	SRC	NCON	REC	O	DG	CHER	FLU	FL	ND	ND	ND	ND	ND	35	15	ND	80	ND
256	SRC	NCON	REC	O	DG	CHER	FLU	FM	ND	ND	ND	ND	ND	37	5	ND	78	120
257	SRC	NCON	REC	O	DG	CHER	FLU	FM	ND	ND	ND	ND	ND	34	20	ND	46	120
652	ND	HCON	NREC	R	HG	GLEY	FLU	FM	ND	ND	ND	ND	ND	55	ND	ND	ND	100

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
251	10YR	2	1	10YR	4	1	10YR	4	2	M	MC	PR	BM	50	3	MID	SIL	SIL
252	10YR	2	1	10YR	3	2	10YR	4	2	WM	MC	PR	BM	70	2	UP	L	L
253	10YR	2	1	10YR	4	2	2.5Y	4	2	ST	FM	SAB	BM	ND	1	LOW	C	C
254	10YR	2	1	10YR	3	2	10YR	3	1	W	MC	PR	BM	ND	2	LOW	L	L
255	10YR	2	1	10YR	3	2	10YR	4	1	WM	M	PR	BM	ND	2	UP	L	SIL
256	10YR	2	1	10YR	3	3	10YR	5	2	WM	M	PR	BM	ND	1	UP	L	L
257	10YR	2	1	10YR	3	2	10YR	5	2	M	M	PR	BM	ND	1	UP	L	L
652	10YR	2	1	ND	ND	ND	2.5Y	2	1	ND	ND	ND	ND	5	1	DEP	L	ND

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	AC03	EC	PHA	PHC	CARB
251	SCO	56.5	24.1	19.4	SL	SC	20.0	25.0	5.0	3.2	ND	ND	5.3	7.1	7 03
252	SCO	62.4	22.7	14.9	SL	SC	29.0	31 0	2.0	10.5	ND	ND	5.4	6.9	7.21
253	SRC	21.3	51.7	27.0	SIL	CL	18.0	28.0	10.0	.5	ND	ND	6.0	7.2	5.06
254	SRC	20.9	51 5	27.7	SIL	CL	18.0	28 0	8.0	.5	ND	ND	5.4	5 8	7 92
255	SRC	8.6	58.8	32.6	SICL	CL	19.0	28.0	9.0	.7	ND	ND	5.2	6.0	6.02
256	SRC	22.9	48.9	28.2	CL	CL	17.0	25 0	8 0	5.2	ND	ND	4 9	7.3	5 62
257	SRC	.0	63.1	36.9	SICL	CL	22.0	36.0	14 0	3.0	ND	ND	4.8	7.3	6.86
652	ND	21.0	41.1	27 8	CL	ML	30 0	49 0	19.0	4.5	ND	ND	6.4	6.9	18.43

UNIT SRC
U.NO 2
UTN 41
T.NO 11
TWP 22
R 4
DIR W
MER 5
TLEN 500
INT 120
NOBS 4

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
259	ND	LCON	REC	R	DG	CHER	FLU	FL	ND	ND	ND	ND	ND	20	20	ND	ND	40
260	ND	HCON	NREC	R	G	GLEY	FLU	GV	ND	ND	ND	ND	ND	ND	ND	ND	ND	0
261	ND	MCON	REC	R	DG	CHER	FLU	FM	ND	ND	ND	ND	ND	13	ND	ND	ND	13
262	SRC	NCON	REC	O	DG	CHER	FLU	FL	ND	ND	ND	ND	ND	22	ND	ND	15	37

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
259	10YR	3	2	ND	ND	ND	10YR	4	2	ND	ND	ND	ND	ND	2	UP	L	ND
260	ND	ND	ND	ND	ND	ND	10YR	4	1	ND	ND	ND	ND	80	ND	DEP	ND	ND
261	10YR	3	1	ND	ND	ND	10YR	4	2	ND	ND	ND	ND	ND	2	UP	L	ND
262	10YR	3	1	10YR	4	2	10YR	4	2	ND	ND	MASS	BC	ND	3	CR	L	L

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
259	ND	36.1	36.2	27.7	L	CL	20.0	32.0	12.0	9.4	.59	ND	6.7	7.5	4.68
260	ND	29.6	42.7	27.7	L	ML	28.0	42.0	14.0	16.7	ND	ND	ND	7.4	ND
261	ND	15.4	49.2	35.4	SICL	ML	27.0	42.0	15.0	5.1	.67	ND	6.9	7.6	7.96
262	SRC	27.8	36.0	36.1	CL	CL	20.0	32.0	12.0	10.8	ND	ND	5.3	7.4	6.61

UNIT SRC
U.NO 2
UTN 42
T.NO 26
TWP 22
R 4
DIR W
MER 5
TLEN 585
INT 65
NOBS 9

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
263	ND	HCON	NREC	R	G	GLEY	FLU	FM	ND	ND	ND	ND	40	ND	ND	ND	ND	0
264	ND	LCON	NREC	CU	HR	REGO	FLU	FL	ND	ND	ND	ND	ND	10	ND	ND	ND	0
265	H2O	HCON	REC	ND	G	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
266	ND	HCON	REC	O	HG	GLEY	FLU	FM	ND	ND	ND	ND	8	26	ND	ND	12	45
267	ND	MCON	NREC	O	BL	CHER	FLU	FL	ND	ND	ND	ND	3	53	ND	ND	80	ND
268	ND	LCON	REC	GL	DG	CHER	FLU	FL	ND	ND	ND	ND	ND	27	ND	ND	77	97
269	ND	LCON	REC	CU	HR	REGO	FLU	FL	ND	ND	ND	ND	ND	15	ND	ND	ND	15
270	ND	MCON	NREC	GL	DG	CHER	FLU	FL	ND	TILL	FL	C	ND	27	ND	ND	28	55
271	ND	MCON	NREC	R	DG	CHER	FLU	FL	ND	ND	ND	ND	ND	ND	ND	ND	ND	0

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
263	10YR	2	1	ND	ND	ND	5Y	4	1	ND	ND	ND	ND	ND	1	UP	PT	ND
264	10YR	3	2	ND	ND	ND	10YR	4	2	ND	ND	ND	ND	30	4	CR	L	ND
265	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	DEP	ND	ND
266	10YR	3	1	10YR	3	1	2.5Y	5	1	ND	ND	MASS	BG	20	ND	DEP	CL	CL
267	10YR	2	1	10YR	5	2	ND	ND	ND	ND	ND	MASS	BM	ND	2	UP	CL	C
268	10YR	3	2	10YR	4	3	10YR	5	1	ND	ND	MASS	BM	ND	3	MID	L	L
269	10YR	3	1	ND	ND	ND	10YR	4	2	ND	ND	ND	ND	ND	2	MID	L	CL
270	10YR	3	2	10YR	4	2	10YR	4	2	ND	ND	MASS	BM	10	2	MID	L	CL
271	10YR	3	1	ND	ND	ND	10YR	5	1	ND	ND	ND	ND	ND	2	LOW	L	ND

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
263	ND	22.9	40.8	36.2	CL	CL	22.0	37.0	15.0	5.5	9.44	ND	7.2	7.5	25.80
264	ND	43.4	30.1	26.5	L	CL	20.0	31.0	11.0	14.9	5.40	ND	7.2	7.5	5.26
265	H2O	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
266	ND	25.6	36.0	38.4	CL	CL	20.0	37.0	17.0	5.4	17	ND	6.8	7.0	6.85
267	ND	25.7	37.1	37.2	CL	ND	ND	ND	ND	0	21	ND	6.5	7.1	7.23
268	ND	35.3	35.4	29.3	CL	CL	20.0	34.0	14.0	10.5	ND	ND	5.2	7.4	5.80
269	ND	40.7	34.1	25.3	L	CL	21.0	31.0	10.0	9.2	4.48	ND	7.0	7.5	7.98
270	ND	30.6	36.3	32.9	CL	CL	23.0	36.0	15.0	8.8	5.16	ND	7.1	7.5	5.36
271	ND	45.3	30.0	24.7	L	SC	23.0	32.0	9.0	12.0	6.01	ND	7.1	7.5	7.36

UNIT SRC
U NO 2
UTN 43
T.NO 5
TWP 24
R 3
DIR W
MER 5
TLEN 325
INT 65
NOBS 5

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
272	ND	LCON	REC	R	DG	CHER	FLU	FL	ND	ND	ND	ND	ND	19	ND	ND	5	O
273	ND	LCON	REC	R	DG	CHER	FLU	FL	ND	ND	ND	ND	ND	17	ND	ND	ND	O
274	H2O	HCON	REC	ND	G	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
275	ND	LCON	REC	R	DG	CHER	FLU	FL	ND	ND	ND	ND	ND	15	ND	ND	ND	O
276	ND	LCON	REC	R	DG	CHER	FLU	FL	ND	ND	ND	ND	ND	10	ND	ND	ND	O

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
272	10YR	3	2	10YR	5	2	10YR	4	2	WM	M	PR	BMK	ND	2	UP	L	L
273	10YR	3	1	ND	ND	ND	10YR	4	2	ND	ND	ND	ND	ND	1	UP	L	ND
274	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
275	10YR	4	2	ND	ND	ND	10YR	5	2	ND	ND	ND	ND	ND	2	UP	L	ND
276	10YR	3	2	ND	ND	ND	10YR	4	2	ND	ND	ND	ND	ND	1	UP	L	ND

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
272	ND	14.7	56.6	28.8	SICL	ML	25.0	37.0	12.0	14.6	8.71	ND	7.2	7.5	6.14
273	ND	26.4	48.4	25.2	SIL	CL	22.0	35.0	13.0	24.7	9.73	ND	7.2	7.6	5.86
274	H2O	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
275	ND	9.5	60.7	27.7	SICL	ML	30.0	45.0	15.0	8.2	10.74	ND	7.1	7.5	5.11
276	ND	22.6	40.9	36.5	CL	CL	22.0	31.0	9.0	ND	8.29	ND	7.1	ND	5.11

UNIT SRC
U NO 2
UTN 44
T NO 15
TWP 22
R 4
DIR W
MER 5
TLEN 650
INT 65
NOBS 10

URN	SER	CON	STAT	SG	GG	ORD	P1 M	P1 T	P1 S	P2 M	P2 T	P2 S	LFHT	AH T	AHET	AE T	B TH	LIME
277	ND	LCON	NREC	CU	HR	REGO	FLU	FM	ND	ND	ND	ND	NC	ND	15	ND	ND	15
278	ND	MCON	NREC	CU	HR	REGO	FLU	FM	ND	TILL	FL	C	ND	ND	25	ND	55	60
279	ND	MCON	REC	O	G	GLEY	FLU	FS	ND	ND	ND	ND	ND	ND	ND	ND	33	33
280	ORG	HCON	NREC	TR	M	ORG	ORG	ORG	ND	FLU	FM	ND	ND	ND	ND	ND	NC	O
281	ORG	HCON	NREC	TR	M	ORG	ORG	ORG	ND	FLU	FM	ND	ND	ND	ND	ND	ND	O
282	FSH	HCON	NREC	O	BL	CHER	LG	FL	ND	ND	ND	ND	ND	35	ND	ND	45	80
283	ND	MCON	NREC	CU	HR	REGO	FLU	FL	ND	FG	GV	ND	ND	14	ND	ND	66	O
284	SRC	NCON	REC	O	DG	CHER	FLU	FL	ND	ND	ND	ND	ND	18	ND	ND	47	65
285	SRC	NCON	REC	O	DG	CHER	FLU	FL	ND	FG	GV	ND	ND	25	ND	ND	55	30
286	ND	LCON	NREC	CU	HR	REGO	FLU	FL	ND	ND	ND	ND	ND	13	ND	ND	ND	13

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
277	10YR	3	2	ND	ND	ND	10YR	3	2	ND	ND	ND	ND	ND	1	UP	SIL	ND
278	10YR	3	2	10YR	3	2	10YR	3	2	ND	ND	MASS	BC	10	1	UP	SIL	SIL
279	ND	ND	ND	10YR	5	1	10YR	5	2	ND	ND	MASS	BG	ND	1	LOW	ND	SCL
280	10YR	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	DEP	PT	ND
281	10YR	2	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	DEP	PT	ND
282	10YR	2	1	10YR	5	2	2.5Y	5	2	WM	F	SAB	BM	ND	3	MID	CL	HC
283	10YR	3	2	ND	ND	ND	10YR	4	2	ND	ND	ND	ND	75	2	MID	SICL	ND
284	10YR	3	2	10YR	4	2	10YR	4	2	ND	ND	MASS	BC	10	2	UP	L	SCL
285	10YR	3	2	10YR	3	3	10YR	3	3	ND	ND	MASS	BC	5	2	UP	L	SIL
286	10YR	3	2	ND	ND	ND	10YR	4	2	ND	ND	ND	ND	ND	2	MID	L	L

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	ACO3	EC	PHA	PHC	CARB
277	ND	26.0	49.1	24.9	SIL	ML	24.0	36.0	12.0	6.9	5.84	ND	7.1	7.4	4.86
278	ND	23.9	49.3	26.8	SIL	ML	24.0	35.0	11.0	4.4	2.96	ND	7.0	7.5	4.53
279	ND	42.9	31.9	25.2	L	CL	19.0	26.0	7.0	5.1	ND	ND	7.2	7.4	6.84
280	ORG	ND	ND	ND	ND	ND	ND	ND	ND	NC	ND	ND	6.9	7.4	32.21
281	ORG	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
282	FSH	0	34.5	65.5	HC	CH	21.0	51.0	30.0	14.2	ND	ND	5.1	7.5	8.59
283	ND	43.7	33.5	22.8	L	CL	20.0	27.0	7.0	5.7	13.89	ND	7.1	7.4	4.09
284	SRC	45.8	31.0	23.2	L	SC	19.0	25.0	6.0	5.3	ND	ND	5.4	7.3	4.38
285	SRC	30.8	40.9	28.3	CL	CL	20.0	28.0	6.0	3.4	ND	ND	6.4	7.3	4.72
286	ND	28.4	50.3	21.3	SIL	ML	23.0	31.0	8.0	5.7	.85	ND	6.7	7.5	4.76

UNIT SRC
U.NO 2
UTN 45
T NO 2
TWP 25
R 3
DIR W
MER 5
TLEN 325
INT 65
NOBS 5

URN	SER	CON	STAT	SG	GG	ORD	P1.M	P1.T	P1.S	P2.M	P2.T	P2.S	LFHT	AH.T	AHET	AE.T	B.TH	LIME
287	POT	HCON	NREC	R	HG	GLEY	LG	FC	ND	ND	ND	ND	10	8	ND	ND	ND	0
288	ND	MCON	NREC	R	DG	CHER	FLU	FC	ND	LG	FC	ND	ND	30	ND	ND	ND	C
289	ND	LCON	REC	R	DG	CHER	FLU	FM	ND	ND	ND	ND	ND	12	ND	ND	ND	12
290	ND	HCON	NREC	D	BL	CHER	FLU	FL	ND	ND	ND	ND	ND	30	ND	ND	10	40
291	POT	HCON	NREC	D	HG	GLEY	LG	FC	ND	ND	ND	ND	ND	34	ND	ND	56	90

URN	AVAL	AHUE	ACHR	BVAL	BHUE	BCHR	CVAL	CHUE	CCHR	BGRD	BCLS	BKND	BTYP	CF.C	SLOP	SL.P	ATEX	BTEX
287	10YR	3	1	ND	ND	ND	10YR	5	1	ND	ND	ND	ND	ND	ND	DEP	C	ND
288	10YR	3	1	ND	ND	ND	10YR	4	2	ND	ND	ND	ND	ND	2	UP	CL	ND
289	10YR	3	1	ND	ND	ND	10YR	4	2	ND	ND	ND	ND	ND	2	UP	L	ND
290	10YR	2	1	10YR	4	3	2.5Y	4	2	WM	F	SAB	BM	ND	3	UP	L	CL
291	10YR	2	1	10YR	5	1	2.5Y	5	2	W	F	SAB	BG	ND	1	DEP	L	C

URN	SER	S	SI	C	USDA	USSC	WP	WL	IP	CACO	AC03	EC	PHA	PHC	CARB
287	POT	12.0	40.8	47.3	SIC	MH	35.0	50.0	15.0	25.6	9.75	ND	7.6	7.9	12.93
288	ND	19.1	42.6	38.3	SICL	MH	34.0	51.0	17.0	11.2	1.61	ND	7.3	7.7	11.09
289	ND	33.5	34.7	31.8	CL	CL	20.0	32.0	12.0	15.2	.38	ND	6.8	7.9	8.52
290	ND	23.3	35.3	41.1	C.	CL	18.0	34.0	13.0	9.7	.38	ND	7.1	7.6	7.66
291	POT	17.4	41.9	40.7	C.	CL	18.0	40.0	22.0	5.0	ND	ND	6.2	7.3	7.78

APPENDIX 3

Soil Property Confidence Interval Determinations for each Unit and Series

DESCRIPTIVE MEASURES <1> UNIT:ADY*U.NO:1

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH T	45	9.0000	110.00	19.644	14.933	(15.904,23.385)
33.AHET	0					
34 AE T	0					
35 B.TH	37	5.0000	50 000	22 973	10.610	(20.028,25.918)
36 LIME	39	16.000	140 00	43.308	21.845	(37.410,49.205)
37 P2.D	45	30 000	999.00	420 40	456 13	(306 15,534.65)
51 CF C	41	1.0000	10.000	3 0732	2 6210	(2 3839,3.7624)
59 LFHT	0					
65 WP	44	14 000	29.000	20 455	2.6186	(19 791,21.118)
66 WL	44	25.000	45.000	33.023	4 2123	(31.955,34.090)
67 IP	44	8.0000	22.000	12.568	2.6711	(11 891,13.245)
68.CACO	44	14.300	41.800	23.918	5.5312	(22.516,25.320)
71.PHA	45	6.4000	7 7000	7 1422	24725	(7.0803,7.2042)
72 PHC	44	7.6000	8.4000	7.8705	18625	(7.8233,7 9177)
73.CARB	45	2.3900	8.5200	4.2962	1 1364	(4.0116,4.5809)
74.SAND	44	4.9029	42.649	21 952	8.3285	(19 841,24 063)
75.SILT	44	38.781	64 615	50.805	5.4972	(49.412,52.199)
76.CLAY	44	18.570	47.670	27.243	5 9241	(25.741,28.744)

DESCRIPTIVE MEASURES <2> UNIT:ATL*U.NO 1

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	9000 CONFIDENCE INTERV
32.AH.T	37	12.000	40 000	19.162	7 1706	(17.172,21.152)
33.AHET	0					
34 AE T	0					
35 B TH	35	10 000	60 000	29 429	11 099	(26 256,32 601)
36 LIME	37	12 000	90 000	47 027	16 497	(42.448,51.606)
37 P2 D	37	999.00	999.00	999 00		
51 CF C	36	3 0000	20.000	9 8889	4 4643	(8.6318,11 146)
59 LFHT	0					
65 WP	37	18.000	29 000	22 351	2 7205	(21.596,23 106)
66 WL	37	29.000	52 000	36 270	4 8628	(34.921,37.620)
67 IP	37	9.0000	25.000	13 919	3 1303	(13.050,14 788)
68 CACO	37	9.7000	33 900	18 235	5 2230	(16 785,19 585)
71 PHA	37	5 5000	7 3000	6.3081	49294	(6.1713,6 4449)
72 PHC	37	7.2000	8.1000	7 6000	15456	(7 5571,7 6429)
73.CARB	37	3.3700	8 7700	5 8981	1.2661	(5 5467,6.2495)
74 SAND	37	3.8404	29.615	16 596	5 8925	(14 960,18 231)
75.SILT	37	37.427	60.240	51 259	4 4795	(50 015,52 502)
76 CLAY	37	22.470	57.870	32 146	6 7889	(30 261,34 030)

DESCRIPTIVE MEASURES <3> UNIT:DEL*U.NO:1

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH.T	43	13.000	52.000	17.721	6.2805	(16 110,19.332)
33 AHET	4	5.0000	10.000	7.7500	2.6300	(4.6554,10.845)
34.AE.T	0					
35.B TH	40	11.000	62.000	30.300	9 8871	(27.666,32.934)
36 LIME	43	14.000	100.00	46.302	15.984	(42.202,50.402)
37 P2.D	43	60.000	999.0C	762 81	407 67	(658 25,867.38)
51 CF C	39	1 0000	10.000	3 7692	2 1820	(3.1802,4 3583)
59 LFHT	0					
65.WP	43	0.	24.000	19.047	3.4980	(18 149,19.944)
66.WL	43	0.	41.000	33.326	6 0227	(31 781,34.870)
67.IP	42	8.0000	19.000	14.619	2.5371	(13.960,15.278)
68 CACO	43	5.4000	29.300	14 151	5.9829	(12 617,15 686)
71 PHA	43	5.0000	6.8000	5.5558	46818	(5.4357,5.6759)
72 PHC	43	7.5000	8.2000	7 7465	.13336	(7.7123,7.7807)
73.CARB	43	2.9800	7.6700	4.5577	1.0933	(4.2772,4.8381)
74.SAND	43	11.686	77.486	30.522	10 033	(27.948,33.095)
75 SILT	43	12.844	62.531	40 908	8.3591	(38.764,43.052)
76.CLAY	43	9.6700	35.870	28.570	4.8284	(27.332,29.808)

DESCRIPTIVE MEASURES <5> UNIT:DVG*U.NO:1

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH T	26	12.000	38.000	19 962	5.4734	(18 128,21 795)
33.AHET	0					
34 AE T	4	5.0000	27 000	12 000	10 231	(-.38246 -1,24.038)
35 B TH	26	12 000	75 00C	38 077	17 249	(32 299,43 855)
36 LIME	26	30 000	105 00	59 885	18 911	(53 550,66 220)
37 P2.D	26	50.000	999 00	711 42	439 98	(564 03,858 81)
51 CF C	24	1.0000	10 000	4 0000	2 1669	(3 2419,4 7581)
59 LFHT	0					
65 WP	26	17.000	30 000	22 808	3.3943	(21 671,23.945)
66 WL	26	22.000	56 000	41 615	7 8947	(38 971,44.260)
67 IP	26	2.0000	28 000	18.808	5.1925	(17.068,20.547)
68 CACO	26	.30000	25 800	15 335	5 1896	(13.596,17.073)
71.PHA	26	5.1000	7 0000	5 7269	40650	(5.5907,5.8631)
72 PHC	26	6.3000	7 9000	7.5231	28748	(7.4268,7 6194)
73 CARB	26	3.4700	9 1400	6 7781	1.2036	(6.3749,7.1813)
74.SAND	26	4.3071	30.278	10 221	6 2032	(8 1431,12.299)
75 SILT	26	24 094	58 052	44 951	8 4703	(42.114,47 789)
76 CLAY	26	11.670	70 670	44 828	13 003	(40 472,49.184)

DESCRIPTIVE MEASURES (30) UNIT:ELB*U.NO:2

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH.T	7	9.0000	27 000	15.143	6.2564	(10.548,19.738)
33.AHET	12	2.0000	13.000	9.0000	3.4641	(7.2041,10.796)
34 AE.T	9	3.0000	15.000	9.5556	3.5040	(7.3836,11.727)
35.B TH	19	25.000	76.000	43.526	16.032	(37.148,49.904)
36 LIME	20	38.000	90.000	58.650	15.198	(52 774,64.526)
37.P2 D	20	58.000	999 00	722 05	434.09	(554 21,889.89.
51 CF.C	9	1.0000	10 000	3 1111	2.8038	(1.3732,4 8490)
59.LFHT	15	3.0000	25.000	9.2667	6.4083	(6.3524,12.181)
65.WP	20	17.000	33.000	24 000	3.6850	(22.575,25.425)
66 WL	20	31.000	68.000	50 150	11.417	(45.736,54.564)
67.IP	20	12.000	40.000	25.900	8.4161	(22.646,29.154)
68.CACO	20	0.	29.300	12.915	10.688	(8.7825,17.048)
71.PHA	18	5 0000	6.6000	5.6889	.43099	(5.5122,5.8656)
72.PHC	20	6.0000	7.7000	7 3450	.46394	(7.1656,7.5244)
73.CARB	18	1 4900	34.520	7.0772	7.1779	(4.1341,10.020)
74.SAND	20	3.9154	24 599	7 5123	6.0908	(5.1573,9.8673)
75.SILT	20	23.260	59.927	37.818	10.003	(33.950,41.685)
76.CLAY	20	32.670	71 470	54 670	12.722	(49.751,59.589)

DESCRIPTIVE MEASURES (8) UNIT:FSH*U.NO:1

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32 AH T	47	13.000	43 000	22.128	6 8513	(20.450,23.805)
33.AHET	4	5.0000	25 000	11 750	9 4296	(.65441,22.846)
34.AE T	3	10 000	10.000	10.000		
35 B TH	45	7.0000	57.000	30 578	11 071	(27 805,33 351)
36 LIME	48	20.000	78 000	52 063	13.926	(48.690,55 435.
37 P2.D	48	60.000	999 00	903.67	282 56	(835.23,972.10)
51 CF C	15	1 0000	5.0000	2 0000	1.3628	(1.3803,2.6197)
59.LFHT	8	3.0000	10 000	5.3750	3 0677	(3.3202,7 4298)
65 WP	48	19.000	31 000	24 938	2.9057	(24 234,25.641)
66 WL	48	37.000	69 000	50.521	8.2668	(48 519,52.523)
67 IP	48	16.000	39 000	25.583	6.2017	(24.081,27.085)
68 CACO	48	.20000	38 900	16 827	8.6686	(14 728,18.927)
71 PHA	48	4.7000	7 2000	5.9833	63559	(5.8294,6 1373)
72 PHC	48	6.7000	8 0000	7 6167	.22534	(7 5621,7.6712)
73 CARB	48	4.3600	17 270	7 2650	2.0901	(6 7588,7 7712)
74 SAND	48	3.8696	16 295	6 1440	2 9744	(5.4236,6.8643)
75 SILT	48	12.844	58.260	36 765	10 300	(34.271,39.260)
76 CLAY	48	33.570	81 470	57 091	11.265	(54 363,59 819.

DESCRIPTIVE MEASURES <31> UNIT:FSH*U.NO:2

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH.T	35	5.0000	42.000	20.257	6.9635	(18.267,22.247)
33.AHET	1	8.0000	8 0000	8.0000		
34.AE.T	4	7.0000	13 000	9.0000	2 7080	(5.8135,12 186)
35.B.TH	27	6.0000	59 000	22.778	13.089	(18.481,27.074)
36.LIME	29	15.000	130 00	39.655	25.307	(31.661,47.649)
37.P2.D	35	53.000	999 00	918.89	265 45	(843.00,994.77)
51 CF.C	3	1.0000	10.000	4 3333	4 9329	(-3.9828,12.649)
59 LFHT	3	5.0000	23.000	13 333	9 0738	(-1.9637,28 630)
65 WP	35	17.000	31.000	23 429	3.8370	(22.332,24.525)
66.WL	35	33.000	57.000	44 000	6.6465	(42 100,45.900)
67.IP	35	13.000	30 000	20.571	4.8766	(19 178,21.965)
68.CACO	35	.50000	44 600	27.391	10.982	(24.252,30 530)
71.PHA	35	5.0000	7.6000	6 5400	.64635	(6.3553,6.7247)
72 PHC	35	6.7000	8.3000	7.8086	.25938	(7.7344,7.8827)
73.CARB	35	4.1100	28.840	9 1483	3 8783	(8.0398,10.257)
74.SAND	35	3.9071	20.840	5 7241	3.8075	(4.6359,6.8124)
75 SILT	35	25.760	67.219	44.540	8.9639	(41.978,47 102)
76.CLAY	35	27 470	69.070	49 736	10.038	(46.867,52 605)

DESCRIPTIVE MEASURES <54> UNIT·FSH*U NC 3

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	9000 CONFIDENCE INTERV
32.AH T	21	6.0000	40 000	20 429	7.3998	(17.644,23.214)
33.AHET	2	4.0000	7 0000	5 5000	2.1213	(-3 9706,14 971)
34 AE T	5	2 0000	8.0000	5 6000	2.5100	(3 2070,7.9930)
35 B TH	20	10.000	51 000	30 750	9 4917	27.080,34 420)
36 LIME	21	18.000	75 000	51 571	13 746	(46.398,56 745)
37 P2.D	21	50.000	999 00	562 00	469 86	(385.16,738 84)
51.CF C	6	1.0000	30 000	9 6667	12.307	(-.45771,19.791)
59.LFHT	0					
65.WP	19	21 000	31.000	25 211	3 0836	(23.984,26 437)
66 WL	19	38.000	67 000	47 684	7 0558	(44.877,50 491)
67 IP	19	15.000	36 000	22 474	5 7385	(20 191,24 757)
68.CACO	18	6.7000	25 300	15 006	6.4415	(12 364,17 647)
71 PHA	20	4.7000	6.8000	6 0250	67346	(5 7646,6.2854)
72 PHC	18	7.3000	8 4000	7 6833	.22295	(7 5919,7 7747)
73.CARB	20	4.5300	16.480	8 1615	2 8372	(7 0645,9 2585)
74.SAND	19	3.8988	18.836	6 1639	3 4229	(4.8022,7.5256)
75 SILT	19	18.990	57 531	39 324	11 511	(34 745,43.903)
76 CLAY	19	34 570	75 570	54 512	12.318	(49 612,59 412)

DESCRIPTIVE MEASURES <10> UNIT:LLK*U.NO:1

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH.T	40	9.0000	45.000	21.625	9.3526	(19.133,24 117)
33.AHET	1	17.000	17.000	17.000		
34.AE.T	0					
35.B TH	30	5.0000	55.000	21 600	11.075	(18.164,25.036)
36.LIME	26	10.000	100.00	42.269	21.986	(34.904,49.635)
37 P2.D	41	110.00	999.00	977.32	138.84	(940.81,1013.8)
51 CF C	6	1.0000	3.0000	1.6667	1.0328	(.81705,2.5163)
59.LFHT	0					
65 WP	41	17.000	29 000	22.805	2.4720	(22.155,23.455)
66 WL	41	25.000	50.000	36.610	6.1639	(34.989,38 231)
67.IP	41	6.0000	28.000	13.805	4.6055	(12 594,15.016)
68.CACO	40	12.800	45.200	27.330	7.3954	(25.360,29.300)
71.PHA	40	6.6000	7.5000	7.1050	.19342	(7.0535,7.1565)
72 PHC	41	7.4000	8 1000	7.8195	14869	(7.7804,7.8586)
73.CARB	40	4.2900	8.4800	5.9327	.83142	(5.7113,6.1542)
74.SAND	40	3.7071	25.299	10.522	6 8708	(8.6913,12.352)
75.SILT	40	46.594	71 385	57.771	6.2923	(56.095,59.447)
76.CLAY	40	15.770	49.070	31.707	8.6234	(29.410,34.005)

DESCRIPTIVE MEASURES <11> UNIT:LTC*U.NO:1

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	9000 CONFIDENCE INTERV
32.AH T	24	2.0000	40.000	18 125	13.788	(13.301,22.949)
33.AHET	19	1.0000	10 000	4.8947	2 4013	(3.9395,5 8500)
34 AE T	19	3.0000	15.000	9.2632	3 7836	(7.7580,10.768)
35.B TH	35	16.000	100.00	52 229	19 504	(46 654,57.803)
36.LIME	33	27.000	120 00	74 697	21 233	(68 436,80.958)
37.P2 D	35	60.000	999 00	789.23	391 06	(677 46,901.00)
51.CF C	31	4.0000	20 000	9 4839	3.3053	(8.4763,10.491)
59.LFHT	34	1.0000	15.000	5.0588	2 7955	(4 2475,5.8702)
65.WP	33	0	32.000	19 818	4 9146	(18.369,21 267)
66.WL	33	0	44 000	32 030	6.9977	(29.967,34.094)
67 IP	32	6.0000	20 000	12.594	3.0571	(11 677,13.510)
68.CACO	33	.20000	28.500	12.658	7 8892	(10.331,14.984)
71 PHA	34	4.3000	7.1000	5 4324	.66091	(5.2405,5.6242)
72.PHC	33	6.5000	7 7000	7 4242	.20005	(7.3653,7.4832)
73.CARB	33	.78000	13 690	5 5427	3 2968	(4 5706,6.5148)
74.SAND	33	6.8654	66 540	25 013	11 529	(21.613,28.412)
75.SILT	33	21.490	64 198	49 229	7 7084	(46.957,51.502)
76.CLAY	33	1: 970	36 770	25.758	6 5118	(23 838,27.678)

DESCRIPTIVE MEASURES (18) UNIT:RSN=U.NO:1

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH.T	12	4.0000	60.000	18.417	17.763	(9.2076,27.626)
33.AHET	19	1.0000	27.000	10.211	7.2845	(7.3126,13.108)
34.AE T	16	3.0000	20.000	11.500	4.3970	(9.5730,13 427)
35 B.TH	25	22.000	71.000	47.600	13.653	(42.928,52.272)
36.LIME	25	45.000	102.00	67 960	15.850	(62.537,73.383)
37 P2 D	28	35.000	999 00	765 50	411.95	(632.90,898.10)
51 CF C	19	1.0000	30.000	5 7895	6.8765	(3 0538,8.5251)
59 LFHT	18	2.0000	10 000	5 7778	2.6247	(4.7016,6.8540)
65 WP	26	17.000	32 000	22.077	3 3577	(20.952,23.202)
66 WL	26	27.000	59 000	42.346	9.3891	(39.201,45.491)
67 IP	26	6.0000	32.000	20.269	6.6847	(18.030,22.509)
68.CACO	27	0.	31.000	10.785	8.5924	(7.9648,13.606)
71.PHA	26	4.3000	6.9000	5.4962	.64030	(5.2817,5.7107)
72 PHC	27	5.8000	7.7000	7 2963	.47352	(7 1409,7 4517)
73.CARB	26	.88000	8.3800	4.2327	1.8119	(3.6257,4 8397)
74.SAND	27	3.9696	30.699	13.655	9 0435	(10.687,16.624)
75.SILT	27	26.365	66.177	45.012	8.7263	(42 148,47.876)
76.CLAY	27	15.470	66 570	41.333	12.422	(37.256,45.410)

DESCRIPTIVE MEASURES (20) UNIT·SPR=L NO:1

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH T	1	15.000	15 000	15 000		
33 AHET	12	2.0000	45.000	7 5833	12 034	(1 3447,13.822)
34.AE T	32	3.0000	32.000	15 594	6 6471	(13 601,17 586)
35 B TH	33	7.0000	99 000	43 455	24 622	(36 194,50 715)
36 LIME	24	7.0000	100 00	58 833	19 743	(51.926,65 740)
37 P2.D	37	40.000	999 00	848.35	347.26	(751 97,944 73)
51 CF C	35	1.0000	70.000	21 029	16 858	(16 210,25 847)
59 LFHT	36	3.0000	14 000	4 3056	2.0815	(3 7194,4 8917)
65 WP	30	0.	32 000	20 100	4 9295	(18.571,21.629)
66 WL	30	0.	68 000	35 233	12 673	(31.302,39.165)
67 IP	29	5.0000	36.000	15 655	8 0944	(13 098,18 212)
68.CACO	31	0.	9 5000	1 3032	2 4515	(55593,2.0505)
71 PHA	35	4.2000	6 3000	5 0514	42521	(4 9299,5 1730)
72 PHC	32	4.6000	7 4000	6 1531	78329	(5 9184,6.3879)
73.CARB	35	.87000	6 0400	2.0694	1 4633	(1 6512,2 4877)
74 SAND	30	4.7779	66 586	26.971	13 173	(22.884,31 057)
75.SILT	30	27.844	63 365	42 649	9 1548	(39 809,45 489)
76 CLAY	30	5.5700	66 170	30.380	14 147	(25.991,34 769)

DESCRIPTIVE MEASURES <21> UNIT:SPY*U.NO:1

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH.T	28	4.0000	50.000	15.929	9.7560	(12.788,19.069)
33.AHET	1	5.0000	5.0000	5.0000		
34.AE.T	1	20.000	20.000	20.000		
35.B.TH	26	5.0000	47.000	25.615	11.913	(21.625,29.606)
36.LIME	26	15.000	85.000	41.385	16.950	(35.707,47 063)
37.P2.D	28	40.000	999.00	897.39	298.73	(801.23,993.55)
51.CF.C	28	1.0000	99.000	21.750	17.530	(16.107,27.393)
59.LFHT	2	2.0000	4.0000	3.0000	1.4142	(-3.3138,9 3138)
65.WP	25	17.000	42.000	23.800	5.4924	(21.921,25.679)
66.WL	25	29.000	49.000	38.280	5.3348	(36.455,40.105)
67.IP	25	4.0000	23.000	14.480	3.8635	(13.158,15.802)
68.CACO	25	3.2000	32.600	16.152	6.8922	(13.794,18.510)
71.PHA	28	4.9000	7.1000	6.0857	.59424	(5.8944,6.2770)
72.PHC	25	7.0000	7.8000	7.4680	.19732	(7.4005,7.5355)
73.CARB	28	4.4800	14.180	9.0332	2.7133	(8.1598,9.9066)
74.SAND	25	8.6946	56.053	22.912	11.734	(18.897,26.927)
75.SILT	25	37.010	61.906	47.602	7.1562	(45.153,50.051)
76.CLAY	25	5.2700	43.670	29.486	7.9521	(26.765,32.207)

DESCRIPTIVE MEASURES <22> UNIT:MDAD*U.NO.1

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH.T	7	12.000	26.000	17.000	4.8990	(13 402,20.598)
33 AHET	0					
34.AE.T	0					
35.B.TH	7	10.000	44.000	25.000	13.952	(14.753,35.247)
36.LIME	7	23.000	65 000	42.000	18.276	(28.577,55.423)
37.P2.D	7	74.000	999.00	737.71	446.27	(409.95,1065.5)
51.CF.C	3	2.0000	5.0000	4.0000	1.7321	(1.0800,6.9200)
59.LFHT	0					
65.WP	7	18.000	27.000	20.286	3.0394	(18.053,22.518)
66.WL	7	25.000	43.000	31.857	6.2564	(27.262,36.452)
67.IP	7	6.0000	16.000	11.571	4.5408	(8.2364,14.906)
68.CACO	7	12.600	30.100	22 529	6.8176	(17.521,27.536)
71.PHA	7	5.3000	6.4000	5.6571	.36450	(5.3894,5.9248)
72.PHC	7	7.7000	8.0000	7.7429	.11339	(7.6596,7.8261)
73.CARB	7	3.6200	6.4700	4.9200	.90870	(4.2526,5.5874)
74.SAND	7	17 103	39.924	29.219	7.1066	(24.000,34.438)
75.SILT	7	39.406	53.677	47.382	5.4303	(43.394,51.371)
76.CLAY	7	16.670	32.970	23.399	5.4768	(19.376,27.421)

DESCRIPTIVE MEASURES (23) UNIT:SRC*U.NO:1

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH.T	22	12.000	55.000	27.818	11.198	(23.710,31 926)
33.AHET	3	5.0000	20.000	13.333	7.6376	(.45741,26.209)
34.AE T	0					
35.B TH	16	4.0000	110.00	50.750	28.006	(38.476,63 024)
36.LIME	15	30.000	135 00	81.200	33.967	(65.753,96.647)
37 P2 D	22	55.000	999.00	661 00	457 70	(493.09,828.91)
51 CF C	8	5.0000	70 000	47.500	23 905	(31.488,63 512)
59 LFHT	0					
65.WP	22	17.000	31 000	22.500	4 1605	(20 974,24 026)
66.WL	22	25.000	49.000	32.864	7 4149	(30 143,35.584)
67.IP	22	2.0000	20.000	10.364	4.5622	(8.6899,12 037)
68.CACO	22	.50000	22.900	6.7682	5.6295	(4.7029,8.8335)
71.PHA	22	4.8000	7.5000	6.1636	.78652	(5.8751,6.4522)
72.PHC	22	5.8000	7.8000	7.2318	50933	(7.0450,7.4187)
73.CARB	22	4.2700	18.430	7.2168	3 1481	(6.0619,8 3717)
74.SAND	22	3.4446	67.528	31.139	17.798	(24.610,37 668)
75 SILT	22	26.802	68.885	48.346	13.232	(43.491,53.200)
76.CLAY	22	5.6700	39.770	20.515	8.0502	(17.562,23.469)

DESCRIPTIVE MEASUPES (46) UNIT SRC*U.NO:2

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH T	23	8.0000	53 000	21 435	10.513	(17.670,25 199)
33 AHET	3	15.000	25 000	20 000	5.0000	(11 571,28 429)
34.AE T	0					
35 B TH	14	5.0000	60 000	41 714	24 978	(29 892,53 537
36.LIME	17	12.000	97 000	44 706	28 611	(32.591,56 821)
37 P2.D	33	60 000	999 00	806 79	376 36	(695 81,917.77)
51.CF C	8	5 0000	80 000	30.000	30.355	(9.6671,50 333)
59 LFHT	4	3.0000	40 000	15 250	16 761	(-4.4719,34.972)
65 WP	28	18 000	35 000	22 786	4 4084	(21.367,24 205)
66.WL	28	25 000	51 000	35 786	7 0991	(33.501,38 071)
67 IP	28	6.0000	30 000	12.893	4.9015	(11.315,14 471)
68 CACO	28	0	25 600	9 7571	5 9711	(7.8351,11 679)
71.PHA	29	5.1000	7 6000	6 7414	67110	(6.5294,6.9534)
72.PHC	29	7.1000	7 9000	7 4759	16400	(7.4241,7.5277)
73.CARB	29	4.0900	32 210	8 1403	6 1796	(6.1882.10 092)
74.SAND	29	4.6363	50 582	32 015	11 529	(28 373,35.657)
75 SILT	29	34.406	66 385	45 049	8 2248	(42.451,47 647)
76 CLAY	29	12.070	56 270	22 936	9 1622	(20.041,25.830)

<DESCRIBE BYSTRATA VAR=SAME STRAT=V3 LEVELS=.9>

DESCRIPTIVE MEASURES <1> SER:ADY

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH T	15	9.0000	30.000	15.933	6.0647	(13.175,18.691)
33.AHET	0					
34.AE.T	0					
35 B TH	15	10.000	40.000	20 933	9.2077	(16.746,25.121)
36 LIME	15	23.000	70.000	36.867	13.098	(30.910,42.823)
37 P2 D	15	999 00	999.00	999.00		
51 CF C	15	1.0000	10.000	5 1333	3.1818	(3.6864,6.5803)
59 LFHT	0					
65.WP	15	14.000	27.000	19.467	2 7997	(18.193,20.740)
66 WL	15	27.000	43.000	31.800	4 0743	(29.947,33.653)
67 IP	15	9.0000	16.000	12.333	2.4976	(11 197,13.469)
68.CACO	15	12.600	30.100	20.653	5.0503	(18.357,22.950)
71 PHA	15	5.4000	7.3000	6.8200	67316	(6.5139,7.1261)
72.PHC	15	7.6000	8.1000	7.7867	.14075	(7.7227,7.8507)
73.CARB	15	2.6500	8.5200	4.3967	1 4990	(3 7149,5.0784)
74.SAND	15	17.103	42.649	28.452	7.6308	(24.981,31.922)
75.SILT	15	38.781	53.156	46 545	4 7160	(44.400,48.690)
76 CLAY	15	18.570	32.970	25.003	4 3701	(23.016,26.991)

DESCRIPTIVE MEASURES <2> SER:ATL

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH T	34	12.000	40.000	19.176	7.1498	(17.101,21.252)
33 AHET	0					
34 AE T	0					
35 B TH	34	10 000	60 000	29 588	11.244	(26.325,32 852)
36 LIME	34	22 000	90 000	48 794	15.657	(44.250,53 338)
37 P2 D	34	999 00	999 00	999 00		
51.CF C	34	3 0000	20 000	9 7353	4.1583	(8.5284,10 942)
59 LFHT	1	3 0000	3 0000	3 0000		
65 WP	34	18 000	29 000	22 176	2.5640	(21 432,22 921)
66 WL	34	29.000	45 000	35 735	4 2162	(34.512,36 959)
67 IP	34	9 0000	21 000	13 559	2.6764	(12 782,14.336)
68 CACO	34	9 7000	33 900	18 224	5 0290	(16.764,19 683)
71 PHA	34	5.5000	7 3000	6 2441	46135	(6.1102,6 3780)
72.PHC	34	7 2000	7 9000	7 5853	13288	(7 5467,7 6239)
73.CARB	34	3 3700	8 7700	6 0582	1 3127	(5.6773,6 4392)
74 SAND	34	3 8404	29.615	17.005	5 7154	(15 346,18 663)
75 SILT	34	42 115	60 240	51.722	4 0974	(50.533,52.912)
76 CLAY	34	22 470	45 670	31 273	5 5643	(29 658,32 888)

DESCRIPTIVE MEASURES <25> SER:BPW

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH.T	11	10.000	26.000	16.545	5.2795	(13.660,19.431)
33.AHET	0					
34.AE.T	0					
35.B TH	3	5.0000	11.000	8.6667	3.2146	(3.2474,14.086)
36.LIME	5	10.000	26.000	19.000	5.9161	(13.360,24.640)
37 P2.D	11	999.00	999.00	999 00		
51 CF C	0					
59.LFHT	0					
65 WP	11	17.000	29.000	23.455	3.2051	(21.703,25.206)
66 WL	11	27.000	44.000	35.818	5 7065	(32.700,38.937)
67.IP	11	8 0000	18.000	12.364	3.2023	(10.614,14.114)
68.CACO	11	15.500	41.700	28.055	7.4013	(24.010,32.099)
71.PHA	11	6.8000	7.5000	7.1636	.20136	(7.0536,7.2737)
72 PHC	11	7.7000	8.1000	7.8909	.13003	(7.8198,7.9620)
73.CARB	11	4 2900	6.5300	5.5955	73048	(5.1963,5.9946)
74.SAND	11	3.7071	23.290	11 346	6.6179	(7 7295,14 963)
75.SILT	11	47.427	64 198	56.348	5.3755	(53.410,59.285)
76.CLAY	11	20.870	48.270	32.306	7.5603	(28.175,36 438)

DESCRIPTIVE MEASURES <3> SER DEL

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH.T	33	13.000	25.000	16 939	3.6567	(15 861,18 018)
33.AHET	0					
34 AE T	0					
35 B TH	33	11 000	62 000	30 697	10 561	(27 583,33 811)
36 LIME	33	25 000	80 000	47 515	12.390	(43 862,51 169
37 P2.D	33	999.00	999 00	999.00		
51 CF C	33	2 0000	10 000	3 8485	1.8221	(3 3112,4.3858)
59 LFHT	0					
65 WP	33	16.000	22 000	19 303	1 7227	(18 795,19 811)
66.WL	33	30 000	41 000	35 333	2 6300	(34 558,36 109)
67 IP	33	13 000	21 000	16 030	2 0231	(15 434,16 627)
68 CACO	33	6 8000	19.600	12 445	3.1013	(11 531,13 360)
71.PHA	33	4 8000	6 5000	5 4333	.41282	(5.3116,5 5551
72 PHC	33	7 6000	8 1000	7 7576	13236	(7.7185,7 7966)
73 CARB	33	2 9800	7 6700	4.6273	1 1364	(4 2922,4.9624)
74 SAND	33	19 757	40.211	30 865	4 3987	(29.568,32 162)
75 SILT	33	29.719	51 073	38 311	3 7021	(37.219,39 403)
76.CLAY	33	24.170	35.870	30 825	2 7482	(30.014,31 635)

DESCRIPTIVE MEASURES <5> SER:DVG

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH T	21	13.000	38.000	23.143	8.0888	(20.099,26.187)
33 AHET	2	5.0000	10.000	7.5000	3.5355	(-8.2844,23.284)
34.AE T	0					
35 B TH	21	17.000	65 000	37.667	13.485	(32.592,42.742)
36 LIME	21	40 000	95.000	63.524	16.741	(57.223,69.825)
37 P2 D	21	999.00	999.00	999.00		
51 CF C	21	2.0000	30.000	6.3810	6 0206	(4.1150,8.6469)
59 LFHT	7	1 0000	5.0000	2 7143	1 3801	(1.7006,3 7279)
65 WP	20	16.000	28.000	21 600	3.5748	(20 218,22.982)
66 WL	20	26 000	51.000	38.150	7 5552	(35.229,41 071)
67.IP	20	10.000	24.000	16 550	4.2732	(14.898,18.202)
68.CACO	20	9.6000	26.700	15.540	4.8225	(13.675,17 405)
71 PHA	20	4 7000	7.1000	5.7000	.51708	(5.5001,5 8999)
72 PHC	20	7 4000	7.8000	7.5150	.81273 -1	(7.4836,7.5464)
73 CARB	19	3.7400	9.1400	6.9511	1 2174	(6.4668,7.4353)
74.SAND	20	4.3071	29.653	13.464	8.3050	(10.253,16.675)
75.SILT	20	30.448	64.198	49.016	7.6879	(46.043,51.988)
76 CLAY	20	18.670	60.370	37.520	12.288	(32.769,42.271)

DESCRIPTIVE MEASURES <6> SER EBO

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32 AH T	4	13.000	17.000	15.250	1.7078	(13 240,17 260)
33 AHET	0					
34 AE T	0					
35 B TH	0					
36 LIME	2	16.000	17.000	16.500	70711	(13 343,19 657)
37 P2 D	4	60 000	80 000	70 000	11 547	(56 413,83 587)
51 CF C	2	1.0000	2 0000	1 5000	70711	(-1 6569,4.6569)
59 LFHT	0					
65 WP	4	19.000	23.000	21 000	1 8257	(18.852,23 148)
66 WL	4	33.000	39 000	36.500	2.5166	(33 539,39 461)
67 IP	4	14 000	17 000	15 500	1 2910	(13 981,17 019)
68 CACO	4	18.700	41 800	28 225	10 105	(16.335,40 115
71 PHA	4	5.7000	7 7000	7 0500	91104	(5.9780,8 1220)
72 PHC	4	7.6000	8 1000	7 8500	.20817	(7.6051,8.0949)
73 CARB	4	4.4900	5 2600	4 8575	31542	(4.4863,5.2287)
74 SAND	4	5 9238	24 224	15 700	8.5272	(5 6659,25 734)
75 SILT	4	44 406	59 406	50 630	6 4023	(43.097,58 164)
76 CLAY	4	30 770	37 870	33.670	3.2833	(29.807,37.533)

DESCRIPTIVE MEASURES <7> SER:ELB

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH T	1	4.0000	4.0000	4.0000		
33.AHET	3	1.0000	9.0000	4.0000	4.3589	(-3.3485,11.348)
34.AE T	6	3.0000	15.000	9.1667	4 2622	(5.6604,12.673)
35 B TH	6	35.000	55.000	39 833	7 9099	(33 326,46 340)
36.LIME	6	47.000	100.00	62.833	19 488	(46.802,78.865)
37 P2.D	6	56.000	999 00	692 33	475 27	(301.36,1083.3)
51 CF C	1	10 000	10 000	10 000		
59 LFHT	4	4 0000	5 0000	4.5000	57735	(3.8206,5 1794)
65 WP	6	19.000	27 000	21.833	2 9269	(19 426,24.241)
66 WL	6	31.000	61 000	43.000	10 100	(34.692,51.308)
67 IP	6	12.000	34.000	21.167	7.2503	(15.202,27 131)
68.CACO	6	1.0000	29.500	17.800	10.494	(9.1675,26.432)
71.PHA	6	5 1000	5 4000	5.2333	10328	(5.1484,5.3183)
72.PHC	6	6.8000	7 7000	7.4500	.33317	(7 1759,7 7241)
73.CARB	6	1.6300	6 0400	2.7817	1 6714	(1.4067,4.1566)
74.SAND	6	4.1696	11.865	6.7015	2 7773	(4.4168,8.9862)
75.SILT	6	29.406	59 927	47 045	11 079	(37.931,56 159)
76.CLAY	6	32.670	65.570	46.253	11 007	(37.199,55.308)

DESCRIPTIVE MEASURES <8> SER:FSH

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH T	63	13.000	43.000	23 016	7.3452	(21.471,24.561)
33.AHET	2	[illegible] 0000	5.0000	4 5000	70711	(1 3431,7.6569)
34.AE T	2	2 0000	10 000	6 0000	5.6569	(-19 255,31 255)
35 B TH	63	6 0000	57.000	28 873	12 193	(26.308,31.438)
36 LIME	63	22.000	80.000	52 349	13 667	(49.474,55.224)
37 P2.D	63	94 000	999 00	941 98	220.74	(895 55,988.42)
51 CF C	13	1 0000	5.0000	2.0000	1 4142	(1.3009,2.6991)
59 LFHT	5	3 0000	6 0000	4 0000	1 4142	(2 6517,5.3483)
65 WP	62	19 000	31 000	25 371	2 8413	(24.768,25.974)
66 WL	62	38.000	69.000	50 565	7 5696	(48.959,52.170)
67 IP	62	15.000	39.000	25 194	6 0132	(23.918,26.469)
68 CACO	62	20000	39 800	18 331	9 1495	(16 390,20 271)
71 PHA	63	4.7000	7 2000	6 0317	60477	(5.9045,6.1590)
72 PHC	62	6.7000	8 3000	7 6548	.23517	(7.6050,7.7047)
73 CARB	63	4 3800	16 480	7 6216	2 0124	(7 1982,8 0449)
74 SAND	62	3.8988	14 228	5 1514	1 4721	(4.8392,5.4637)
75 SILT	62	12.844	57 531	36 617	10 864	(34.313,38.922)
76 CLAY	62	38.570	81 470	58 231	10 692	(55 963,60 499)

DESCRIPTIVE MEASURES <10> SER:LLK

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH.T	18	15.000	40.000	22.778	7.0340	(19.894,25.662)
33.AHET	1	17.000	17.000	17.000		
34.AE.T	0					
35.B.TH	18	13.000	50.000	22.556	8.5696	(19.042,26.069)
36.LIME	18	30 000	90.000	46.278	13.915	(40.572,51 983)
37 P2 D	18	110.00	999.00	949.61	209.54	(863.69,1035.5)
51 CF C	3	1.0000	3.0000	1.6667	1.1547	(-.27999,3.6133)
59.LFHT	0					
65.WP	18	18 000	27.000	22.500	2.7493	(21.373,23 627)
66.WL	18	25.000	52.000	36.389	7.2041	(33.435,39.343)
67.IP	18	7.0000	25.000	13.889	4 8128	(11.915,15.862)
68.CACO	17	12.800	39.200	26.082	6.5539	(23.307,28.858)
71.PHA	17	6.7000	7.3000	7.0882	.14090	(7 0286,7.1479)
72.PHC	18	7.5000	8.1000	7.7444	.11991	(7.6953,7.7936)
73.CARB	17	4.3100	6.7000	5.7382	.73586	(5 4266,6.0498)
74.SAND	17	3.7154	25.299	10 247	7.5249	(7 0604,13.433)
75.SILT	17	37 427	70.448	57.654	7.9785	(54.275,61.032)
76.CLAY	17	15.770	57.870	32 099	11 052	(27.419,36.779)

DESCRIPTIVE MEASURES <11> SER:LTC

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	9000 CONFIDENCE INTERV
32 AH T	1	3.0000	3.0000	3 0000		
33.AHET	5	1.0000	3.0000	2 4000	89443	(1.5473,3.2527)
34 AE T	7	6.0000	15.000	12 000	3 2660	(9.6013,14.399)
35 B TH	7	48.000	82.000	58 429	11 646	(49 875,66 982)
36 LIME	7	63 000	100.00	72 571	13 819	(62.422,82 721)
37 P2.D	7	999.00	999 00	999 00		
51 CF C	7	5.0000	10.000	8 5714	2 4398	(6 7795,10.363)
59 LFHT	7	3.0000	8.0000	6 4286	1 8127	(5.0973,7 7599)
65 WP	7	17.000	32.000	21 000	5 1640	(17 207,24 793)
66 WL	7	26.000	44.000	33 857	6 1218	(29.361,38.353)
67 IP	7	9.0000	16.000	12 857	2 9114	(10.719,14 995)
68 CACO	7	4.5000	19 700	10 914	5 2673	(7.0457,14.783)
71 PHA	7	4.3000	5 2000	4 8000	.34641	(4.5456,5.0544)
72 PHC	7	7.3000	7 6000	7 4286	11127	(7 3468,7.5103)
73 CARB	7	1.2300	5.5700	2.5186	1 4598	(1 4464,3.5907)
74.SAND	7	12 182	31.028	19 838	6.6827	(14 930,24 746)
75 SILT	7	46.802	62.948	52 263	5 2821	(48 384,56 143)
76 CLAY	7	19 670	34.270	27 899	5 2252	(24 061,31 736)

DESCRIPTIVE MEASURES <15> SER:POT

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH.T	18	8.0000	34.000	17.667	6.9027	(14.836,20.497)
33.AHET	3	2.0000	8.0000	5.0000	3.0000	(-.57563 -1,10.058)
34.AE.T	2	7.0000	8.0000	7.5000	70711	(4.3431,10.657)
35.B TH	14	10.000	76.000	41 714	19.392	(32.536,50.893)
36 LIME	16	15.000	130.00	58 000	30.720	(44.536,71.464)
37 P2 D	19	60.000	999.00	804 11	387 78	(649.84,958.37)
51 CF C	5	1.0000	10.000	3 6000	3 6469	(.12306,7.0769)
59 LFHT	10	3.0000	25 000	9 6000	6.6700	(5 7335,13.466)
65 WP	19	17 000	35.000	22.632	4.7983	(20.723,24.540)
66.WL	19	33.000	66.000	45.684	10.409	(41.543,49.825)
67.IP	19	15.000	40.000	23.053	7.4123	(20.104,26.001)
68.CACO	18	0.	44.600	16 395	14 921	(10.459,22.331)
71 PHA	18	5.2000	7.6000	6 4278	69095	(6.1445,6 7111)
72.PHC	18	6.0000	[illegible] 1000	7.4632	.58043	(7.2322 7 6941)
73.CARB	18	4.1100	34.520	9.5128	6.9619	(6.6582,12.367)
74 SAND	19	3.9696	24 011	9 1775	6.9788	(6.4011,11.954)
75.SILT	19	27.323	55 760	42.405	8 4939	(39.026,45.784)
76.CLAY	19	31.470	67.570	48 417	11.537	(43.828,53.007)

DESCRIPTIVE MEASURES <17> SER·RKV

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH T	33	12.000	34.000	18.030	4.8765	(16.592,19.468)
33.AHET	0					
34 AE T	0					
35 B TH	33	7 0000	50 000	25 879	9 5058	(23 076 28 682)
36.LIME	33	19.000	80 000	45 121	12 646	(41 392,48 850)
37 P2 D	33	30.000	100 00	70 576	15 496	(66.006,75 145)
51 CF C	22	1.0000	4 0000	1 7727	1 0204	(1.3984,2.1471)
59 LFHT	0					
65 WP	33	17.000	25 000	20 667	1.9791	(20 083,21 250)
66 WL	33	25.000	45 000	33 576	3 6403	(32.502,34 649)
67 IP	33	8.0000	22 000	12 909	2.7880	(12.087,13 731)
68 CACO	33	8.8000	34 000	22 976	6 3011	(21 118,24 834)
71 PHA	33	5.0000	7 4000	6 4818	91496	(6 2120,6 7516)
72 PHC	33	7.5000	8 4000	7 7970	18955	(7 7411,7 8529)
73.CARB	33	2.3900	6 4700	4 2546	.92173	(3 9831,4 5266)
74 SAND	33	4.9029	35 403	20 181	7 6234	(17.933,22 429)
75 SILT	33	40.135	64 615	52 525	6 0246	(50.748,54 301)
76 CLAY	33	19 070	47 670	27 294	5 6609	(25 625,28 963)

DESCRIPTIVE MEASURES <18> SER:RSN

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH.T	0					
33.AHET	4	2.0000	5.0000	3.2500	1.2583	(1.7694,4.7306)
34.AE.T	7	3.0000	20.000	13.571	6.1875	(9.0270,18.116)
35.B.TH	5	37.000	67.000	55.200	13.084	(42.726,67.674)
36.LIME	5	60.000	78.000	70.000	8.1240	(62.255,77.745)
37.P2.D	7	80.000	999.00	867 71	347.35	(612.60,1122.8)
51.CF.C	6	2.0000	5.0000	3.8333	1.1690	(2.8716,4.7950)
59.LFHT	7	2.0000	7.0000	4.1429	1.6762	(2.9118,5.3739)
65.WP	7	19.000	32.000	23.571	4.2370	(20.460,26 683)
66.WL	7	35.000	68.000	48.857	11.950	(40.080,57.634)
67.IP	7	16.000	36.000	25.286	8.0356	(19.384,31.188)
68.CACO	7	0.	14.800	6.9857	6.9925	(1.8501,12.121)
71.PHA	5	4.9000	5.3000	5.0800	.16432	(4.9233,5.2367)
72.PHC	7	5.8000	7.5000	6.8714	.78467	(6.2951,7.4477)
73.CARB	5	1.0900	3.4000	2.1540	.88246	(1.3127,2.9953)
74.SAND	7	4.8988	25.395	9.3773	7.6546	(3.7554,14.999)
75 SILT	7	28.781	54.198	40.567	8.4260	(34.378,46.755)
76.CLAY	7	32.570	66.170	50.056	12.213	(41.086,59.026)

DESCRIPTIVE MEASURES <20> SER.SPR

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH T	0					
33.AHET	5	2.0000	5.0000	3.2000	1.3038	(1.9569,4.4431)
34 AE.T	21	6.0000	32 000	17.857	6 0687	(15.573,20.141)
35.B.TH	21	23.000	99.000	52.619	26.030	(42.822,62.416)
36.LIME	15	44.000	80.000	63.000	13.288	(56.957,69.043)
37 P2.D	21	999.00	999.00	999.00		
51.CF.C	21	10.000	35.000	19.762	8.2880	(16 643,22.881)
59 LFHT	20	3.0000	8.0000	4.5500	1.6051	(3.9294,5.1706)
65.WP	16	18.000	23.000	19.938	1.5692	(19.250,20.625)
66 WL	16	27.000	45.000	34.813	4.4903	(32.845,36.780)
67 IP	16	8.0000	22 000	14.875	3.3242	(13.418,16.332)
68.CACO	16	0.	9.5000	1.8750	3.2702	(.44181,3.3082)
71.PHA	18	4.3000	5.6000	4.9611	.33631	(4.8232,5.0990)
72.PHC	16	5.3000	7 4000	6.1875	.66621	(5.8955,6.4795)
73.CARB	18	.87000	3.4400	1.3789	.65097	(1.1120,1.6458)
74.SAND	16	21.911	44.770	31.028	6.2913	(28.271,33.785)
75.SILT	16	33.260	54.198	40.865	4.9714	(38.686,43.043)
76.CLAY	16	20.670	36.170	28.107	4.7083	(26.044,30 171)

DESCRIPTIVE MEASURES <21> SER·SPY

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	.9000 CONFIDENCE INTERV
32.AH.T	20	9.0000	25.000	13.900	3.7120	(12.465,15.335)
33.AHET	0					
34.AE.T	0					
35.B TH	20	6.0000	47 000	26 400	11 100	(22.108,30.692)
36 LIME	20	16.000	64.000	39 700	12 704	(34.788,44.612)
37 P2.D	20	999.00	999.00	999.00		
51 CF C	20	5 0000	99.000	23.700	19 388	(16.204,31.196)
59 LFHT	1	2.0000	2.0000	2.0000		
65 WP	18	17 000	34 000	23.889	4 0568	(22.225,25.552)
66 WL	18	29 000	49 000	39 333	4.8749	(37.334,41.332)
67 IP	18	11.000	23.000	15.444	2.8122	(14.291,16.598)
68.CACO	18	3 2000	32.600	16.111	7.1078	(13.197,19.026)
71.PHA	20	5.1000	7.0000	6.0450	.58443	(5.8190,6.2710)
72.PHC	18	7 0000	- 7.8000	7.4611	.21731	(7.3720,7.5502)
73.CARB	20	5.2800	13.730	8.7590	2.6662	(7.7281,9.7899)
74.SAND	18	8 6946	31.265	19.627	7 0944	(16.718,22.535)
75.SILT	18	38 365	61.906	48.503	6.5572	(45.815,51.192)
76 CLAY	18	25.270	43.670	31.870	4.6416	(29.967,33.773)

DESCRIPTIVE MEASURES <23> SER:SRC

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV	9000 CONFIDENCE INTERV
32.AH T	12	18.000	43.000	27 500	8.3503	(23.171,31.829)
33.AHET	3	5 0000	20 000	13 333	7.6376	(.45741,26.209)
34 AE T	0					
35 B TH	12	11.000	110 00	54 833	29 872	(39 347,70 320)
36 LIME	10	30.000	135 00	80 300	42 288	(55 787,104 81
37.P2 D	12	110 00	999 00	924 92	256.63	(791.87,1058.0)
51 CF C	2	5.0000	10 000	7 5000	3 5355	(-8.2844,23.284)
59 LFHT	0					
65 WP	12	17.000	24 000	20 000	1 9540	(18 987,21.013)
66 WL	12	25.000	36 000	29.250	3 4145	(27 480,31.020)
67 IP	12	6.0000	14 000	9 2500	2 0944	(8.1642,10.336)
68 CACO	12	50000	10 800	3 8583	2 8237	(2.3944,5.3222)
71 PHA	12	4.8000	6.5000	5 7333	.63293	(5.4052,6.0615)
72 PHC	12	5.8000	7 6000	7 1167	57971	(6 8161,7 4172)
73.CARB	12	4.3800	7 9200	5 7825	1 0181	(5 2547,6 3103)
74 SAND	12	3.4446	50 582	23 453	12.855	(16.788,30.117)
75 SILT	12	35.448	68 885	56 394	10 973	(50 705,62.083)
76.CLAY	12	13.970	27 670	20 153	4 2097	(17 971,22 336)

APPENDIX 4

Analysis of Variance {ANOVA} Output

<ANOVA OPTIONS=EQUALITY VAR=71,66,67,61,62,35,36 STRAT=V2*V5>

UNIVARIATE 1WAY ANOVA
<1> UNIT:ADY*U.NO:1 <2> UNIT:ATL*U.NO:1 <3> UNIT:DEL*U.NO:1 <5> UNIT:DVG*U.NO:1 <8> UNIT:FSH*U.NO:1 <10> UNIT:LLK*U.NO:1 <11> UNIT:LTC*U.NO:1 <18> UNIT:RSN*U.NO:1 <20> UNIT:SPR*U.NO:1 <21> UNIT:SPY*U.NO:1 <23> UNIT:SRC*U.NO:1 <30> UNIT:ELB*U.NO:2 <31> UNIT:FSH*U.NO:2 <46> UNIT:SRC*U.NO:2 <54> UNIT:FSH*U.NO:3

ANALYSIS OF VARIANCE OF 71.PHA N= 486 OUT OF 499 LSD=.24

SOURCE	DF	SUM OF SORS	MEAN SOR	F-STATISTIC	SIGNIF
BETWEEN	14	192.86	13.776	47.310	0
WITHIN	471	137.15	.29118		
TOTAL	485	330.01	(RANDOM EFFECTS STATISTICS)		

ETA= .7645 ETA-SOR= .5844 (VAR COMP= .41845 %VAR AMONG= 58.97)

EQUALITY OF VARIANCES: DF= 14, .10435 +6 F= 8.0435 .0000

STRATA	N	MEAN	VARIANCE	STD DEV
<1>	45	7.1422	.61131 -1	.24725
<2>	37	6.3081	.24299	.49294
<3>	43	5.5558	.21919	.46818
<5>	26	5.7269	.16525	.40650
<8>	48	5.9833	.40397	.63559
<10>	40	7.1050	.37410 -1	.19342
<11>	34	5.4324	.43680	.66091
<18>	26	5.4962	40998	.64030
<20>	35	5.0514	.18081	.42521
<21>	28	6.0857	.35312	.59424
<23>	22	6.1636	.61861	.78652
<30>	18	5.6889	.18575	.43099
<31>	35	6.5400	.41776	.64635
<46>	29	6.7414	.45037	.67110
<54>	20	6.0250	.45355	.67346
GRAND	486	6.1146	.68043	.82488

UNIVARIATE 11WAY ANOVA
<1> UNIT:ADY*U.NO:1 <2> UNIT ATL*U NO:1 <3> UNIT:DEL*U.NO·1 <5> UNIT.DVG=U NO 1 <8> UNIT FSH*U NO 1 <10> UNIT:LLK*U.NO:1 <11> UNIT LTC*U.NO:1 <18> UNIT:RSN*U.NO:1 <20> UNIT:SPR*U.NO:1 <21> UNIT:SPY*U.NO:1 <23> UNIT·SRC*U.NO:1 <30> UNIT:ELB*U.NO:2 <31> UNIT:FSH*U.NO:2 <46> UNIT:SRC*U.NO:2 <54> UNIT:FSH*U NO:3

ANALYSIS OF VARIANCE OF 66.WL N= 477 OUT OF 499 LSD=3.28

SOURCE	DF	SUM OF SORS	MEAN SOR	F-STATISTIC	SIGNIF
BETWEEN	14	18259.	1304.2	23.239	.0000
WITHIN	462	25929.	56.123		
TOTAL	476	44188.	(RANDOM EFFECTS STATISTICS)		

ETA= .6428 ETA-SOR= .4132 (VAR COMP= 39.470 %VAR AMONG= 41.29)

EQUALITY OF VARIANCES: DF= 14, .10101 +6 F= 5.5901 .0000

STRATA	N	MEAN	VARIANCE	STD DEV
<1>	44	33 023	17.744	4.2123
<2>	37	36.270	23.647	4.8628
<3>	43	33.326	36.272	6.0227
<5>	26	41.615	62.326	7.8947
<8>	48	50.521	68 340	8.2668
<10>	41	36.610	37 994	6.1639
<11>	33	32.030	48 968	6 9977
<18>	26	42.346	88.155	9.3891
<20>	30	35.233	160.60	12.673
<21>	25	38.280	28.460	5.3348
<23>	22	32.864	54.981	7.4149
<30>	20	50 150	130.34	11.417
<31>	35	44.000	44.176	6.6465
<46>	28	35.786	50.397	7.0991
<54>	19	47.684	49 784	7.0558
GRAND	477	38.956	92.832	9.6349

UNIVARIATE 11WAY ANOVA
<1> UNIT:ADY*U.NO:1 <2> UNIT:ATL*U.NO:1 <3> UNIT:DEL*U.NO:1 <5> UNIT:DVG*U.NO:1 <8> UNIT:FSH*U.NO:1 <10> UNIT:LLK*U.NO:1 <11> UNIT:LTC*U.NO:1 <18> UNIT:RSN*U.NO:1 <20> UNIT:SPR*U.NO:1 <21> UNIT:SPY*U.NO:1 <23> UNIT:SRC*U.NO:1 <30> UNIT:ELB*U.NO:2 <31> UNIT:FSH*U.NO:2 <46> UNIT:SRC*U.NO:2 <54> UNIT:FSH*U.NO:3

ANALYSIS OF VARIANCE OF 67.IP N= 474 OUT OF 499 LSD=2.21

SOURCE	DF	SUM OF SQRS	MEAN SQR	F-STATISTIC	SIGNIF
BETWEEN	14	10627.	759.05	29.813	.0000
WITHIN	459	11686.	25.460		
TOTAL	473	22313.	(RANDOM EFFECTS STATISTICS)		

ETA= .6901 ETA-SQR= .4763 (VAR COMP= 23.345 %VAR AMONG= 47.83)

EQUALITY OF VARIANCES: DF= 14, 99942. F= 8.4260 .0000

STRATA	N	MEAN	VARIANCE	STD DEV
<1>	44	12.568	7.1348	2.6711
<2>	37	13.919	9.7988	3.1303
<3>	42	14.619	6.4367	2.5371
<5>	26	18.808	26.962	5.1925
<8>	48	25.583	38.461	6.2017
<10>	41	13.805	21.211	4.6055
<11>	32	12.594	9.3458	3.0571
<18>	26	20.269	44.685	6.6847
<20>	29	15.655	65.520	8.0944
<21>	25	14.480	14.927	3.8635
<23>	22	10.364	20.814	4.5622
<30>	20	25.900	70.832	8.4161
<31>	35	20.571	23.782	4.8766
<46>	28	12.893	24.025	4.9015
<54>	19	22.474	32.930	5.7385
GRAND	474	16.804	47.173	6.8682

UNIVARIATE 11WAY ANOVA
<1> UNIT:ADY*U.NO:1 <2> UNIT:ATL*U.NO:1 <3> UNIT:DEL*U.NO:1 <5> UNIT:DVG*U NO:1 <8> UNIT:FSH*U.NO:1 <10> UNIT:LLK*U.NO:1 <11> UNIT:LTC*U.NO:1 <18> UNIT.RSN*U.NO:1 <20> UNIT:SPR*U.NO:1 <21> UNIT:SPY*U NO:1 <23> UNIT:SRC*U.NO:1 <30> UNIT:ELB*U.NO:2 <31> UNIT:FSH*U.NO:2 <46> UNIT:SRC*U.NO:2 <54> UNIT:FSH*U NO:3

ANALYSIS OF VARIANCE OF 61.SI N= 478 OUT OF 499 LSD=3.57

SOURCE	DF	SUM OF SQRS	MEAN SQR	F-STATISTIC	SIGNIF
BETWEEN	14	14720.	1051.4	15.810	.0000
WITHIN	463	30791.	66.502		
TOTAL	477	45510.	(RANDOM EFFECTS STATISTICS)		

ETA= .5687 ETA-SQR= .3234 (VAR COMP= 31 075 %VAR AMONG= 31.85)

EQUALITY OF VARIANCES. DF= 14, .10186 +6 F= 4.3329 .0000

STRATA	N	MEAN	VARIANCE	STD DEV
<1>	44	45.743	27.850	5.2773
<2>	37	46.178	18.493	4.3003
<3>	43	36.242	64.396	8.0247
<5>	26	40.123	66 122	8 1315
<8>	48	32.265	97.764	9 8876
<10>	40	52 430	36 489	6.0406
<11>	33	44.230	54.761	7.4001
<18>	27	40.181	70 178	8.3772
<20>	30	37.913	77.240	8.7886
<21>	25	42.668	47.196	6.8700
<23>	22	43.382	161.36	12.703
<30>	20	33.275	92.210	9.6026
<31>	35	39.729	74.053	8.6054
<46>	29	40.217	62.344	7.8958
<54>	19	34.721	122.11	11 050
GRAND	478	40.908	95.409	9.7678

UNIVARIATE 11WAY ANOVA
<1> UNIT:ADY*U.NO:1 <2> UNIT:ATL*U.NO:1 <3> UNIT:DEL*U.NO:1 <5>
UNIT:DVG*U.NO:1 <8> UNIT:FSH*U.NO:1 <10> UNIT:LLK*U.NO:1 <11> UNIT:
LTC*U.NO:1 <18> UNIT:RSN*U.NO:1 <20> UNIT:SPR*U.NO:1 <21> UNIT:SPY*
U.NO:1 <23> UNIT:SRC*U.NO:1 <30> UNIT:ELB*U.NO:2 <31> UNIT:FSH*U.NO
:2 <46> UNIT:SRC*U.NO:2 <54> UNIT:FSH*U.NO:3

ANALYSIS OF VARIANCE OF 62.C N= 478 OUT OF 499 LSD=4.21

SOURCE	DF	SUM OF SQRS	MEAN SQR	F-STATISTIC	SIGNIF
BETWEEN	14	66891.	4777.9	51.598	0
WITHIN	463	42873.	92.598		
TOTAL	477	.10976 +6	(RANDOM EFFECTS STATISTICS)		

ETA= .7806 ETA-SQR= .6094 (VAR COMP= 147.83 %VAR AMONG= 61.49)

EQUALITY OF VARIANCES: DF= 14, .10186 +6 F= 6.3424 .0000

STRATA	N	MEAN	VARIANCE	STD DEV
<1>	44	36.473	35.095	5.9241
<2>	37	41.376	46.089	6.7889
<3>	43	37.800	23.314	4.8284
<5>	26	54.058	169.08	13.003
<8>	48	66.321	126.90	11.265
<10>	40	40.937	74.363	8.6234
<11>	33	34.988	42.403	6.5118
<18>	27	50.563	154.30	12.422
<20>	30	39.610	200.14	14.147
<21>	25	38.716	63.236	7.9521
<23>	22	29 745	64.806	8.0502
<30>	20	63.900	161.85	12.722
<31>	35	58.966	100.76	10.038
<46>	29	32.166	83.945	9.1622
<54>	19	63.742	151.73	12.318
GRAND	478	45.614	230.11	15.169

UNIVARIATE 11WAY ANOVA
<1> UNIT:ADY*U.NO:1 <2> UNIT:ATL*U.NO:1 <3> UNIT:DEL*U.NO:1 <5>
UNIT:DVG*U.NO:1 <8> UNIT:FSH*U.NO:1 <10> UNIT:LLK*U.NO:1 <11> UNIT:
LTC*U.NO:1 <18> UNIT:RSN*U.NO:1 <20> UNIT:SPR*U.NO:1 <21> UNIT:SPY*
U NO:1 <23> UNIT:SRC*U.NO:1 <30> UNIT:ELB*U.NO:2 <31> UNIT:FSH*U.NO
2 <46> UNIT:SRC*U.NO:2 <54> UNIT:FSH*U.NO 3

ANALYSIS OF VARIANCE OF 35.B.TH N= 428 OUT OF 499 LSD=7.90

SOURCE	DF	SUM OF SQRS	MEAN SQR	F-STATISTIC	SIGNIF
BETWEEN	14	43003.	3071.6	12 754	.0000
WITHIN	413	99467	240.84		
TOTAL	427	.14247 +6	(RANDOM EFFECTS STATISTICS)		

ETA= 5494 ETA-SQR= 3018 (VAR COMP= 99.876 %VAR AMONG= 29.31)

EQUALITY OF VARIANCES. DF= 14, 75804. F= 7.0417 .0000

STRATA	N	MEAN	VARIANCE	STD DEV
<1>	37	22.973	112.58	10.610
<2>	35	29.429	123.19	11.099
<3>	40	30.300	97.754	9.8871
<5>	26	38.077	297 51	17.249
<8>	45	30.578	122.57	11.071
<10>	30	21.600	122.66	11.075
<11>	35	52.229	380.42	19.504
<18>	25	47.600	186.42	13.653
<20>	33	43.455	606.26	24.622
<21>	26	25.615	141.93	11.913
<23>	16	50.750	784.33	28 006
<30>	19	43.526	257.04	16.032
<31>	27	22.778	171.33	13.089
<46>	14	41.714	623.91	24.978
<54>	20	30.750	90 092	9.4917
GRAND	428	34 292	333.65	18.266

UNIVARIATE 11WAY ANOVA
<1> UNIT:ADY*U.NO:1 <2> UNIT:ATL*U.NO:1 <3> UNIT:DEL*U.NO:1 <5> UNIT:DVG*U.NO:1 <8> UNIT:FSH*U.NO:1 <10> UNIT:LLK*U.NO:1 <11> UNIT LTC*U.NO:1 <18> UNIT:RSN*U.NO:1 <20> UNIT:SPR*U.NO:1 <21> UNIT:SPY*U.NO:1 <23> UNIT:SRC*U.NO:1 <30> UNIT:ELB*U.NO:2 <31> UNIT:FSH*U NO:2 <46> UNIT:SRC*U.NO:2 <54> UNIT:FSH*U.NO:3

ANALYSIS OF VARIANCE OF 36.LIME N= 429 OUT OF 499 LSD=6.37

SOURCE	DF	SUM OF SQRS	MEAN SQR	F-STATISTIC	SIGNIF
BETWEEN	14	55542.	3967.3	10 217	0000
WITHIN	414	16076 +6	388 30		
TOTAL	428	.21630 +6	(RANDOM EFFECTS STATISTICS)		

ETA= .5067 ETA-SQR= .2568 (VAR COMP= 126.09 %VAR AMONG= 24.51)

EQUALITY OF VARIANCES: DF= 14, 76999. F= 3.3781 .0000

STRATA	N	MEAN	VARIANCE	STD DEV
<1>	39	43.308	477.22	21.845
<2>	37	47.027	272.14	16.497
<3>	43	46.302	255.50	15.984
<5>	26	59.885	357.63	18.911
<8>	48	52.063	193.93	13.926
<10>	26	42.269	483.40	21.986
<11>	33	74 697	450.84	21.233
<18>	25	67.960	251.21	15.850
<20>	24	58.833	389.80	19.743
<21>	26	41.385	287.29	16.950
<23>	15	81.200	1153.7	33 967
<30>	20	58 650	230.98	15.198
<31>	29	39.655	640.45	25.307
<46>	17	44 706	818.60	28.611
<54>	21	51.571	188.96	13.746
GRAND	429	52 706	505.37	22.480

<ANOVA OPTIONS=EQUALITY VAR=71,66,67,61,62,35,36 STRAT=V3>

UNIVARIATE 1WAY ANOVA

ANALYSIS OF VARIANCE OF 71 PHA N= 315 OUT OF 323

SOURCE	DF	SUM OF SQRS	MEAN SQR	F-STATISTIC	SIGNIF
BETWEEN	15	112.26	7.4840	23.331	0000
WITHIN	299	95.913	.32078		
TOTAL	314	208 17	(RANDOM EFFECTS STATISTICS)		

ETA= .7343 ETA-SQR= 5393 (VAR COMP= .37785 %VAR AMONG= 54 08)

EQUALITY OF VARIANCES DF= 15, 10988. F= 6.9872 0000

SER	N	MEAN	VARIANCE	STD DEV
ADY	15	6.8200	45314	.67316
ATL	34	6.2441	21284	.46135
DEL	33	5.4333	.17042	.41282
DVG	20	5.7000	.26737	51708
ELB	6	5.2333	10667 -1	.10328
FSH	63	6.0317	.36575	.60477
LLK	17	7.0882	19853 -1	.14090
LTC	7	4.8000	12000	.34641
POT	18	6.4278	47742	.69095
RKV	33	6 4818	.83716	.91496
RSN	5	5.0800	.27000 -1	.16432
SPR	18	4.9611	11310	.33631
SPY	20	6.0450	34155	.58443
SRC	12	5.7333	40061	.63293
SHL	3	7.2333	33333 -2	.57735 -1
BPW	11	7.1636	40545 -1	.20136
GRAND	315	6.0568	66297	.81423

UNIVARIATE 1IWAY ANOVA

ANALYSIS OF VARIANCE OF 66.WL N= 314 OUT OF 323

SOURCE	DF	SUM OF SQRS	MEAN SQR	F-STATISTIC	SIGNIF
BETWEEN	15	14349.	956.59	24.313	.0000
WITHIN	298	11725	39.344		
TOTAL	313	26073.	(RANDOM EFFECTS STATISTICS)		

ETA= .7418 ETA-SQR= .5503 (VAR COMP= 48.476 %VAR AMONG= 55.20)

EQUALITY OF VARIANCES: DF= 15, 11996 F= 6 2780 .0000

SER	N	MEAN	VARIANCE	STD DEV
ADY	15	31 800	16.600	4.0743
ATL	34	35.735	17 776	4.2162
DEL	33	35.333	6.9167	2.6300
DVG	20	38.150	57.082	7.5552
ELB	6	43 000	102.00	10.100
FSH	62	50.565	57.299	7.5696
LLK	18	36 389	51.899	7.2041
LTC	7	33.857	37.476	6.1218
POT	19	45.684	108.34	10.409
RKV	33	33.576	13.252	3.6403
RSN	7	48.857	142.81	11.950
SPR	16	34.813	20 162	4 4903
SPY	18	39.333	23.765	4.8749
SRC	12	29.250	11.659	3.4145
SHL	3	35.000	48.000	6.9282
BPW	11	35.818	32.564	5.7065
GRAND	314	39.296	83.302	9.1270

UNIVARIATE 1IWAY ANOVA

ANALYSIS OF VARIANCE OF 67.IP N= 314 OUT OF 323

SOURCE	DF	SUM OF SQRS	MEAN SQR	F-STATISTIC	SIGNIF
BETWEEN	15	8187 9	545.86	28.067	.0000
WITHIN	298	5795.5	19.448		
TOTAL	313	13983	(RANDOM EFFECTS STATISTICS)		

ETA= .7652 ETA-SQR= .5855 (VAR COMP= 27 821 %VAR AMONG= 58.86)

EQUALITY OF VARIANCES: DF= 15, 11996 F= 7.3443 .0000

SER	N	MEAN	VARIANCE	STD DEV
ADY	15	12.333	6.2381	2 4976
ATL	34	13.559	7.1631	2.6764
DEL	33	16.030	4.0928	2 0231
DVG	20	16.550	18 261	4 2732
ELB	6	21.167	52 567	7 2503
FSH	62	25.194	36 159	6 0132
LLK	18	13.889	23.163	4 8128
LTC	7	12.857	8.4762	2 9114
POT	19	23 053	54.942	7 4123
RKV	33	12.909	7.7727	2 7880
RSN	7	25.286	64.571	8.0356
SPR	16	14.875	11.050	3 3242
SPY	18	15 444	7.9085	2 8122
SRC	12	9.2500	4.3864	2.0944
SHL	3	12 333	2 3333	1 5275
BPW	11	12.364	10.255	3.2023
GRAND	314	17 121	44.675	6 6840

UNIVARIATE 1 1WAY ANOVA

ANALYSIS OF VARIANCE OF 61.SI N= 313 OUT OF 323

SOURCE	DF	SUM OF SQRS	MEAN SQR	F-STATISTIC	SIGNIF
BETWEEN	15	14923	994.86	18.825	.0000
WITHIN	297	15696.	52.848		
TOTAL	312	30619.	(RANDOM EFFECTS STATISTICS)		

ETA= .6981 ETA-SQR= 4874 (VAR COMP= 49 959 %VAR AMONG= 48.59)

EQUALITY OF VARIANCES DF= 15, 11944. F= 5.5886 .0000

SER	N	MEAN	VARIANCE	STD DEV
ADY	15	41.653	20.497	4.5274
ATL	34	46 624	15.473	3.9335
DEL	33	33 748	12.631	3.5540
DVG	20	44.025	54.470	7.3804
ELB	6	42.133	113.11	10.636
FSH	62	32.123	108.78	10.430
LLK	17	52.318	58.665	7.6593
LTC	7	47.143	25.713	5.0708
POT	19	37.679	66.491	8.1542
RKV	33	47.394	33.451	5.7836
RSN	7	35 914	65.431	8.0890
SPR	16	36.200	22.777	4.7726
SPY	18	43.533	39.626	6.2949
SRC	12	51.108	110.97	10.534
SHL	3	44.033	1.4233	1.1930
BPW	11	51.064	26.631	5.1605
GRAND	313	41.116	98.137	9.9064

UNIVARIATE 1 1WAY ANOVA

ANALYSIS OF VARIANCE OF 62.C N= 313 OUT OF 323

SOURCE	DF	SUM OF SQRS	MEAN SQR	F-STATISTIC	SIGNIF
BETWEEN	15	46690.	3112 7	46 444	.0000
WITHIN	297	19905.	67.020		
TOTAL	312	66595.	(RANDOM EFFECTS STATISTICS)		

ETA= 8373 ETA-SQR= 7011 (VAR COMP= 161 52 %VAR AMONG= 70 68)

EQUALITY OF VARIANCES. DF= 15, 11944. F= 7.7466 0000

SER	N	MEAN	VARIANCE	STD DEV
ADY	15	34.233	19.098	4.3701
ATL	34	40 503	30.962	5.5643
DEL	33	40 055	7.5526	2.7482
DVG	20	46 750	151 00	12.288
ELB	6	55 483	121.15	11.007
FSH	62	67 461	114.31	10.692
LLK	17	41.329	122.15	11.052
LTC	7	37.129	27.302	5.2252
POT	19	57 647	133 10	11 537
RKV	33	36 524	32.046	5.6609
RSN	7	59.286	149.17	12.213
SPR	16	37.337	22.168	4.7083
SPY	18	41 100	21.545	4.6416
SRC	12	29 383	17.722	4.2097
SHL	3	32.333	13 103	3.6199
BPW	11	41.536	57.159	7.5603
GRAND	313	46 596	213.45	14.610

UNIVARIATE 11WAY ANOVA

ANALYSIS OF VARIANCE OF 35.B.TH N= 306 OUT OF 323

SOURCE	DF	SUM OF SQRS	MEAN SQR	F-STATISTIC	SIGNIF
BETWEEN	15	33477.	2231.8	11.092	.0000
WITHIN	290	58350.	201.21		
TOTAL	305	91827.	(RANDOM EFFECTS STATISTICS)		

ETA= .6038 ETA-SQR= .3646 (VAR COMP= 110.90 %VAR AMONG= 35.53)

EQUALITY OF VARIANCES: DF= 14, 10085. F= 5.8901 .0000

SER	N	MEAN	VARIANCE	STD DEV
ADY	15	20.933	84.781	9.2077
ATL	34	29.588	126.43	11.244
DEL	33	30.697	111.53	10.561
DVG	21	37.667	181.83	13.485
ELB	6	39.833	62.567	7.9099
FSH	63	28.873	148.66	12.193
LLK	18	22.556	73.438	8.5696
LTC	7	58.429	135.62	11.646
POT	14	41.714	376.07	19.392
RKV	33	25.879	90.360	9.5058
RSN	5	55.200	171.20	13.084
SPR	21	52.619	677.55	26.030
SPY	20	26.400	123.20	11.100
SRC	12	54.833	892.33	29.872
SHL	1	5.0000		
BPW	3	8.6667	10.333	3.2146
GRAND	306	32.788	301.07	17.351

UNIVARIATE 11WAY ANOVA

ANALYSIS OF VARIANCE OF 36.LIME N= 302 OUT OF 323

SOURCE	DF	SUM OF SQRS	MEAN SQR	F-STATISTIC	SIGNIF
BETWEEN	15	34380.	2292.0	8.1700	.0000
WITHIN	286	80235	280.54		
TOTAL	301	.11462 +6	(RANDOM EFFECTS STATISTICS)		

ETA= .5477 ETA-SQR= .3000 (VAR COMP= 111.40 %VAR AMONG= 28.42)

EQUALITY OF VARIANCES: DF= 14, 13347. F= 5.3535 .0000

SER	N	MEAN	VARIANCE	STD DEV
ADY	15	36.867	171.55	13.098
ATL	34	48.794	245.14	15.657
DEL	33	47.515	153.51	12.390
DVG	21	63.524	280.26	16.741
ELB	6	62.833	379.77	19.488
FSH	63	52.349	186.78	13.667
LLK	18	46.278	193.62	13.915
LTC	7	72.571	190.95	13.819
POT	16	58.000	943.73	30.720
RKV	33	45.121	159.92	12.646
RSN	5	70.000	66.000	8.1240
SPR	15	63.000	176.57	13.288
SPY	20	39.700	161.38	12.704
SRC	10	80.300	1788.2	42.288
SHL	1	22.000		
BPW	5	19.000	35.000	5.9161
GRAND	302	51.510	380.78	19.514

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